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ABSTRACT

This manual reviews thirty projects selected by the Oregon Educational Coordinating Council (ECC) as exemplary in method, operation, and development. The projects are organized into 9 broad classifications: large group-small group alternatives, autotutorial programmed instruction, process centered, computer and simulation, on-site/field study, interdisciplinary-interinstitutional, media-multisensory reinforcement, integrated curriculum-learning packages, and problem centered. The innovative instruction described ranges from basic skills in writing to upper division chemistry courses. Each project is introduced by a chart which identifies the innovative approach employed in solving the problem. Appendices of related material are included. (Author/MJM)

ABSTRACT

In 1969, the Oregon Legislature created the Oregon program for the Improvement of Instruction, a categorical grant program. The purpose was to improve teaching and enhance learning in public two- and four-year higher educational institutions. The program was administered by the Oregon Educational Coordinating Council (ECC).

This manual reviews thirty projects selected by the ECC as exemplary in method, operation and development. The projects described here indicate the range of areas funded by ECC grants and the various approaches taken by educators.

The information in this report is intended to aid persons who are considering the adaption/adoption of part or all of a project. The projects are organized into nine broad classifications.

1. Large Group/Small Group Alternation
2. Autotutorial Programmed Instruction
3. Process Centered
4. Computer and Simulation
5. Onsite/Field Study
6. Interdisciplinary/Interinstitutional
7. Media/Multisensory Reinforcement
8. Integrated Curriculum/Learning Packages
9. Problem Centered

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The innovative instruction described in this report ranged from basic skills in writing to upper-division chemistry courses. Each project is introduced by a chart which identifies the project by title and author, specifies the problem that the innovative project was designed to solve and identifies the innovative approach employed in solving the problem. ERIC descriptors are included as aids to investigators.

Following the introductory chart, a narrative of five or six pages describes in detail and covers the following points: 1) problem, 2) innovative approach, 3) cost, and 4) evaluation/applicability.

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INNOVATIVE INSTRUCTION IN HIGHER EDUCATION

NORTHWEST REGIONAL EDUCATIONAL LABORATORY

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INNOVATIVE INSTRUCTION IN HIGHER EDUCATION

Thirty Exemplary Projects Conducted in Selected Institutions of Post-Secondary Education--State of Oregon

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June 1973

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*Also see Index, Appendix B as an aid to specific project location by detailed descriptive category.

INTRODUCTION

In 1969, the Oregon Legislature created the Oregon Program for the Improvement of Instruction, a categorical grant program, the purpose of which was to improve teaching and enhance learning in public two- and four-year higher educational institutions. The administration of the program was entrusted to the Oregon Educational Coordinating Council (ECC).

On a biennial basis, competition for grants is held. Projects are selected for funding which show the greatest promise of success, exemplify innovation and propose to benefit the greatest number of students. Since its inception, the program has expended over $1 million, supporting more than eighty projects.

This manual reviews thirty projects selected by ECC as exemplary in method, operation and development. The projects described here indicate the range of areas funded by ECC grants and the uniqueness of approaches taken by educators. Although instruction in the first years of college tends to be emphasized by these projects, all stages of the college career are represented.

The information provided about the projects is intended to aid persons who are considering the adoption of part or all of a project in evaluating that project's applicability. This evaluation takes place at several different places in the manual. To begin with, the thirty projects are organized into nine broad classifications designating the kind of instructional innovations employed:

1. Large Group/Small Group Alternation
2. Autotutorial Programmed Instruction

3. Process Centered

4. Computer and Simulation

5. Onsite/Field Study

6. Interdisciplinary/Interinstitutional

7. Media/Multisensory Reinforcement

8. Integrated Curriculum/Learning Packages

9. Problem Centered

The selection of these categories, which are mostly self-explanatory, was governed by the projects themselves: they fell into these categories. There has, however, been some combining of approaches. This grouping was necessary to avoid overabundance of designations, and also to combine similar types of projects in order that the reader might be exposed to as many alternatives as possible.

Within these large categories, each project is assigned a code number, used for ERIC descriptor references in the index (Appendix B) and for other references to projects. The code number has two numerical elements, the first referring to the category to which the project belongs and the second representing an accession number within the category. Thus a project labeled 41 is the first project in category number 4, "Computer and Simulation." In Appendix C, these code numbers are matched with numbers which the Educational Coordinating Council (ECC) assigned to projects during their operation. [1]

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[1]Appendix C has limited utility for the general reader, but is included to historically identify the projects for participating institutions.

Each project is introduced by a chart which identifies the project by title and author, specifies the problem that the innovative project was designed to solve, and identifies the innovative approach employed in solving the problem. ERIC descriptors are included as an additional aid to the investigator (see Appendix A for detailed explanation). In addition, the chart contains specific information identifying the applicable institution, level, and area of the project and features an indication of potential project applications. These indications are not meant to be proscriptive, exhaustive, or final; rather, the reader is invited to evaluate and to decide for himself the applicability of any given project.

Following the introductory chart, a narrative of five or six pages describes each project in detail, and covers the following points: 1) PROBLEM, 2) INNOVATIVE APPROACH, 3) COST, and 4) EVALUATION/APPLICABILITY. The actual operation of the project is described under the second heading, INNOVATIVE APPROACH. Under the heading of COST, an attempt is made on the basis of available information to assess the cost of the project in terms of variables such as the number of students it can serve now and in the future, time-development costs, and ongoing costs. However, cost figures are quite tentative and are meant only to suggest approximate expenses. For example, in many cases existing facilities may ease the implementation of a particular technique and reduce the cost of application. In other cases more expenditures will be necessary than are listed in the manual.

The final heading, EVALUATION/APPLICABILITY, attempts some kind of evaluation of the project, mostly based on what project planners have been able to accomplish by way of tests, questionnaires, and surveys. Each project

is further judged in terms of where and under what conditions it can be implemented, but again none of these judgments is intended to be final. It is rather hoped that enough information will be brought out to enable readers to come to their own decisions.

The whole question of evaluation is an interesting one for these projects, since an entirely new set of educational goals is often implied, which calls into question the validity of older means of evaluation, such as standardized tests. For example, how does one measure such things as effectiveness in communication, or ability to work together on a job, or a multisensory instructional technique, or ability to conceptualize and understand relationships? And how does one compare these abilities as acquired in traditional instructional situations to their acquisition in these innovative situations?

Important Trends in Higher Education

Our review of the thirty exemplary projects brought out a number of important current trends as well as approaches which have developed over the last several years in Oregon colleges and community colleges.

Four concerns appeared central to project development--a concern for the application of learning theory; a concern for the individual worth of students; an interest in technological innovation; and the need to reorder knowledge.

Learning theory was applied in a variety of ways. The relationship between personality, motivation, and performance was analyzed, and techniques were devised in an attempt to design educational situations appropriate to different personalities and to motivational prerequisites. Some students appeared to be best motivated in an unstructured, self-directed setting; some

appeared to perform best in structured situations which provided external directives as incentives.

Specifically, it was found that some students organize their behavior around grades, defined goals, regular attendance, and assignments. These students need a transitional situation, with some defined activities or counseling, before they are able to function effectively in a self-directed situation requiring that they design their own anchors, goals, and activities.

Other students perform best when they design their own learning goals and activities and can use teaching personnel as consultants or discussants. These students tend to perform more creative work with a better understanding of relationships and concepts.

At least two variables are involved--the structuredness of the educational situation and the personality of the student.

Students appeared changeable on both variables. When project planning produced intermediary measures to aid students in dealing with unstructuredness--or, really, a new structure--some students became more creative and conceptually involved. Similarly, students whose personality did not customarily function well in unfamiliar structures frequently became able to do so. The reward to students and educators was a more enjoyable, involved, and challenging experience.

The sections of this manual titled, Process Centered and Problem Centered, contain some examples of the efforts to devise new structures and techniques to enhance creative conceptual thinking and active involvement. The Computer and Simulation section contains another interesting example.

Another approach to the problem of incentive and application of learning theory is the Learning Packages approach. These are efforts to build learning

goals into the situation, using external structure and student-determined pace and depth.

A variety of technological devices is used to reinforce learning or to simulate real situations. Audiovisual techniques have been developed for a variety of subjects and approaches. The Media section is one source of information on the diverse uses and goals of technology; the Computer and Simulation section is another source.

When wrestling with student involvement, student diversity, and class size, a major concern arose--the need to design instruction which was supportive of the individual's sense of worth.

In an effort to provide personal educational experiences and conceptual depth in a situation of high student-faculty ratio, many projects experimented with Large Group and Small Group Alternation.

This term describes variable class size within a single course and section. A typical usage was one or two very large lecture sessions a week and one or two small, weekly discussion sessions led by instructors. A relatively uncomplicated project is described under the section Large Group and Small Group Alternation as a clear example of this approach. More examples may be found in the list of related projects on the title page for that project.

The approach has been a problematic one for some projects. Continued analysis and planning to overcome these problems may yield a workable formula which can effectively provide the personalization and conceptual depth desired in a course.

Many of the instructional methods were efforts to preserve or reestablish interaction and to legitimize individual needs for time, goal, and method suited to their own personality or situation.

The fourth concern addressed by these innovative projects--the need to reorder knowledge--was the relationship between factual knowledge and reality. This concern was expressed in several ways. The need for relevance, the need to apply several disciplines to a particular problem or career field, and the need to apply theory to reality are examples of a concern that there is too great a gap between what is taught and what is needed in the real world.

In an academic context, these kinds of concerns imply a need to rearrange factual material so that relationships between facts and problems are congruent with reality. When an instructor describes a problem-centered approach, he may be describing an effort to restructure the knowledge and concepts of his discipline. When he describes an interdisciplinary approach, he may be talking about a redefinition of his discipline with respect to other disciplines.

The innovations in this manual are in many ways expressive of an exciting frontier in education. Pressures of population, wide familiarity with new knowledge, and the heightened education of millions of people are effecting new concepts of disciplinary or career education, combined with an intense involvement with and caring about each other. These concepts show up in a diversity of personal and institutional innovations.

We have endeavored to provide an accurate description of each project in this manual and a look at the thinking, planning, and operating required in an innovative program.

Many of these projects have been copied or have received praise in educational circles around and beyond Oregon. There are more provocative projects than can be singled out in this summary. We urge you to explore all the sections for ideas and practices which will excite your imagination, and call your attention to Appendices A and B for assistance in utilizing this manual.

1. LARGE GROUP/SMALL GROUP ALTERNATION

Elementary Philosophy (11) p. 11

Related Projects:

United States History (34) p. 73

Student-Centered Educational Psychology (41) p. 87

Political Extremism (91) p. 237

ELEMENTARY PHILOSOPHY

Frederick P. Harris
Department of Philosophy
Oregon State University
Corvallis, Oregon 97331

Phl 100x
Introduction to Philosophy

Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	O	Community College
	X O	Four-Year Institution
Level		4th year
		3rd year
	O	2nd year
	X O	1st year
Area		Science
	O	Social science
	X O	Humanities
		Education
		Technical/career
		Business Administration
Problem	X	Conceptual difficulty
	X	Diverse backgrounds
		Inflexible scheduling
		Need for personalization
		Issues ignored
	X	Lecture method inhibits learning
	X	Lack of relevance
		Loss of interest
		Realistic experience needed
	X	Alternative course structure needed
		Demand for theory-method consistency
		Other
Innovative Approach		Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
	X	Media/multisensory reinforcement
		Onsite/field study
		Problem centered
		Process centered
		Simulation
		Tutorial/independent study
		Computer
		Programmed instruction
	X	Large group/small group alternation
		Other

ERIC Descriptors

Philosophy, Large Group Instruction, Small Group Instruction, Group Discussion, Group Instruction, Flexible Schedules, Student Participation, Programed Materials, Tape Recordings, Films, Audiovisual Instruction, Audiovisual Aids, Multimedia Instruction, Inductive Methods, Student Testing, Discovery Processes, Student-Teacher Relationship

PROBLEM

Philosophy presents a special problem to the college freshman. The subject is new to him, misinformation about its concepts and methods is common, and the subject material is difficult to master. Differences in age, background, and ability are not well treated in lecture hall situations.

INNOVATIVE APPROACH

Although the traditional goal of philosophy courses, "to engage in dialogue," appears incompatible with today's educational technology, Experimental Introduction to Philosophy 100x at Oregon State University was designed to apply contemporary educational methods and empirically oriented instruction to the teaching of philosophy.

Course planners postulated the effectiveness of large group/small group alternation, with few lectures and maximum use of small group discussion. Classes were loosely structured, flexible as to room arrangements, and geared to group needs. Students served as teacher associates in small group sessions, with the professor "floating" among section meetings.

Other new instructional techniques were used and tested for effectiveness--programed instruction, tapes, films, and self-administered tests. Grades were determined from a preset scale so that students would be discouraged from hindering the learning efforts of others.

Performance goals were established for undergraduate philosophy students, and the achievement of these goals was tested.

Development and exploration of previous research and possible ideas began in January, 1970. Four months before the first session (Fall, 1970) of Philosophy 100x, preliminary work on class materials began. A graduate research assistant surveyed fifty texts, selected instructional films from the Audiovisual Center and supervised photographing of manuscript pages to add to a collection of colored slides used in lectures. With the help of student volunteers, supplementary lectures were taped and made available at the language laboratory.. The supplementary texts were placed in a special reserved section in the library.

The large group/small group alternation provided the structure for the program. The group met as a whole twice a week and in sections once a week. Students alternated as discussion leaders in each of the ten sections into which the class was divided.

A study of the groups conducted by two graduate psychology students using the "Interpersonal Relationship Scale" indicated that lack of cohesiveness and well-defined leadership limited the effectiveness of discussions. As a result, the procedure was modified for the next terms. Instead of 100x students leading, fourteen upper-division philosophy students registered for Philosophy 405 (a seminar) and led discussion groups as part of the requirement for the class. These students were given a general introduction to group processes before acting as chairmen,, and they met with the instructor weekly to discuss assigned materials before meeting with their groups.

Course content was built around five units. Platonic dialogues gave a background for discussion of the question, "What is philosophy?" A programed

manual developed for the course was used for the second and third units, semantics, epistemology, and metaphysics. Religious, ethical, and political philosophy were covered in units four and five.

Class meetings utilized films, slides, overhead projection, and dramatization. Among the presentations were Mortimer Adler's color film lecture on Socrates, slides picturing major philosophers, argument forms and diagrams, and a dramatization of the first act of Maxwell Anderson's play, "Barefoot in Athens." Student debates based on major conflicting ethical theories proved especially effective. Lectures were taped in 20-minute segments and made available in the language laboratory.

For the first two terms, students were asked to write a term paper, but third-term students decided as a group to write short papers on each of the study units. This was an improvement. Short papers pinned students down to specific problems, discouraging the rambling and wordiness typical of freshman term papers.

A preset grading scale provided the basis for a grade "contract." The "contract" was circulated at the beginning of the course, along with space for objections or comments.

Achievement and progress tests first anticipated for use in the project proved inapplicable. Teaching-learning appraisal forms were administered to classes, and students wrote essay evaluations of the course.

Problems and advantages included:

1. Students with limited class discussion experiences had difficulty adjusting to the dialogue method of learning in the small groups;

2. Increased depth and understanding of subject material were apparent;
3. Occasional cases of low student motivation and preparation were evidenced;
4. More time was needed to increase personal involvement and thus commitment and preparation for discussion;
5. More time was needed to deal with difficult subject matter.

COST

Once the program is developed and necessary equipment purchased, costs of continuing it are low. A project director is needed to revise and improve the program, although this task need not be a full time activity. Team teaching is a potentially effective staffing approach.

Major expenses are for development, including communications, duplication, consultants, instructional materials, and salary for the release time of the project director. The budget of this project was $9,004.90.

EVALUATION/APPLICABILITY

Philosophy 100x attained a distinctly innovative flavor. Carefully selected and prepared material was presented with a view to the level of the student. Performance goals for the undergraduate student were not definitively established, but important steps were taken in that direction. The results of this course were used in a program of inquiry into group discussion processes at OSU.

The Philosophy 100x group discussion method was adopted by other courses. Following the project the Department of Philosophy recommended that Philosophy 100x, Introduction to Philosophy, and Critical Thinking be established as a basic philosophy sequence.

The small group/large group alternation of this project is well suited to staffing limitations of introductory courses. It provides students opportunity to air and discuss questions, while affording faculty a chance to convey basic information to a large number of students.

The potential for using audiovisual materials in humanities courses of this type had been largely unexplored before this project, but Philosophy 100x shows this approach to be a viable instructional device.

2. AUTOTUTORIAL/PROGRAMED INSTRUCTION

Audiotutorial Organic Chemistry (21) p. 21

Tutorial Chemistry (22) p. 27

Writing and Listening Skills/Communications Skills Training (23) p. 33

Writing and Mathematics Tutorial (24) p. 41

Related Projects:

Autotutorial Biology (71) p. 151

Elementary Philosophy (11) p. 11

Three Approaches to Western Civilization (33) p. 65

Simulated Law Enforcement Experience (42) p. 97

Projection Tutorial in Biology (75) p. 183

Fundamentals of Nursing (84) p. 221

Integrated Geography (85) p. 229

Continuous Program for Physical Science (31) p. 49

AUDIOTUTORIAL ORGANIC CHEMISTRY

Norman Rose
Department of Chemistry
Portland State University
Portland, Oregon 97207

Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	O	Community College
	X O	Four-Year Institution
Level		4th year
		3rd year
		2nd year
		1st year
Area	X O	Science
	O	Social science
	O	Humanities
	O	Education
	O	Technical/career
	O	Business Administration
Problem		Conceptual difficulty
		Diverse backgrounds
		Inflexible scheduling
	X	Need for personalization
		Issues ignored
	X	Lecture method inhibits learning
		Lack of relevance
	X	Loss of interest
		Realistic experience needed
		Alternative course structure needed
		Demand for theory-method consistency
		Other
Innovative Approach		Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
		Media/multisensory reinforcement
		Onsite/field study
		Problem centered
		Process centered
		Simulation
	X	Tutorial/independent study
		Computer
		Programmed instruction
		Large group/small group alternation
		Other

ERIC Descriptors

Chemistry, Chemistry Instruction, Tape Recorders, Diagnostic Tests, Tutorial Programs, Individual Instruction, Audiovisual Aids, Audiovisual Instruction, Student Developed Materials, Multimedia Instruction

PROBLEM

Student participation in lecture presentation, instructor-student contact, and student creative exploration were low in some Portland State University organic chemistry courses. It was felt that by eliminating the redundance of text and lecture, student interest could be rekindled and learning enhanced.

INNOVATIVE APPROACH

A coordinated presentation of audiotutorial resources and a personal classroom approach were advanced as possible solutions to the need for activating student learning processes.

Course objectives were articulated to implement the innovative approach:

1. Material should be presented to students in a form that requires each student to participate actively in the presentation.
2. The instructor should be allowed to tailor the use of his student contact time to fit the individual needs of the students.
3. The amount of time the student spends actively participating in the learning process should be increased.
4. In some meaningful way, the student should be made aware of the place of his discipline in the affairs of society while at the same time he is learning the substance of the material. In other words, the student should be given the opportunity to explore the breadth of his discipline and to explore his creative bent without sacrificing the depth demanded of him in the discipline.

The existing purpose of the lecture--i. e., to pinpoint material in texts regarded as most important and to clarify points which the author has obscured--would be served by the audiotutorial method by means of taped lectures.

In this project, taped lectures and an accompanying printed note sheet were used, in order to reduce the amount of lecture time and to promote effective student interaction. Frequent, short examinations, replacing the large midterm and final, were given to facilitate a continuous learning process.

Instructor effort, formerly directed toward devising clearer ways of presenting the material, would be redirected toward establishing contact with students, imparting the excitement of the discipline, relating theories and factual material to problems in the real world, discussing the problems which students are expected to know for examinations, and, in general, toward improving the course.

Lecture hours were reduced from the former three to one voluntary hour, which covered special topics.

Tape cassettes, condensing 2-1/2 hours of lecture material into 15-30 minutes, were made available at the University Library, through checkout of tapes, and through use of recorders at the University Audiovisual Center. Weekly quizzes with a repeat were administered. Lectures were few in number and students were not responsible for material presented; no lectures were given in the third quarter. Normal lecture times were used to answer questions on an individual basis.

COST

Of a budget grant of $5,763, only $4,269 was actually spent. The fact that the program was not expanded as planned to include Chem 201 probably accounts for this differential.

Unlike most of the projects in the manual, the budget for supplies and equipment exceeded the budget for salaries--$2,783 was spent on equipment, supplies and services, while $1,365 covered salaries of project directors and clerical help. Purchased equipment included a slave module for duplication of cassette tapes, an item which is now a permanent part of the language laboratory. Other equipment included one playback machine plus headphone per ten students, a tape recorder, a videotape bulk tape eraser, and a six-cassette rapid rewinder. Space was provided by the Audiovisual Center.

This program is readily expandable by making more playback machines available. For an initial outlay of $2,000 for equipment and supplies, this method can serve 100 students. The cost of expansion is $55/10 students, which is the cost of extra playback machines and tapes.

EVALUATION/APPLICABILITY

The project director found that the main advantage of the audiotutorial approach to chemistry lectures was the flexibility it provided in scheduling. Generally, no significant increase was found in content learning. There was an increase in efficiency when presentations included charts and tables. Students came to the taped lectures with the necessary handouts and wasted little time passing material around or searching for the right chart.

The audiotutorial approach is popular and effective with students and is applicable to any lecture course. There is, however, a danger that this device, designed to enable more personal and frequent instructor-student contact, may actually widen the gulf between student and instructor. Students may feel alienated from an instructor who is not in front of the class lecturing, regardless of how many office hours he schedules or the efforts he makes to deal with students on an individual basis.

Planning, therefore, must provide for a clear and workable means of achieving interaction. In designing an audiotutorial program, the instructor must consider how students are motivated to interact, and how he may encourage interaction by use of appropriate scheduling, space, and numbers.

TUTORIAL CHEMISTRY

R. A. Hermens
Department of Chemistry
Eastern Oregon College
LaGrande, Oregon 97850

Ch 204, 205
General Chemistry

Ch 206
Qualitative Analysis

Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	O	Community College
	X O	Four-Year Institution
Level		4th year
		3rd year
	X O	2nd year
	O	1st year
Area	X O	Science
		Social science
		Humanities
		Education
		Technical/career
		Business Administration
Problem		Conceptual difficulty
	X	Diverse backgrounds
		Inflexible scheduling
		Need for personalization
		Issues ignored
		Lecture method inhibits learning
		Lack of relevance
		Loss of interest
		Realistic experience needed
		Alternative course structure needed
		Demand for theory-method consistency
		Other
Innovative Approach		Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
	X	Media/multisensory reinforcement
		Onsite/field study
		Problem centered
		Process centered
		Simulation
	X	Tutorial/independent study
		Computer
		Programmed instruction
		Large group/small group alternation
		Other

ERIC Descriptors

Chemistry, Chemistry Instruction, Science Laboratories, Laboratory Procedures, Audiovisual Aids, Films, Slides, Tutoring, Individual Instruction

PROBLEM

Students enter college with a wide range of backgrounds in science. The first year chemistry course at Eastern Oregon College did not address this problem, and by directing itself to the "average" student, succeeded in failing the poor student and boring the good one. The unsuccessful first year detrimentally affected student progress in later courses.

INNOVATIVE APPROACH

The major innovative approach was the attempt to meet students on their own level, using upper-division students as tutors.

This approach was implemented by dividing the class into two groups for laboratory work, on the basis of their high school background. The lower section had a regular laboratory, plus tutoring provided by sophomore, junior, and senior students.[1] Student learning was ensured by a small student/tutor ration, which varied from 6:1 to 12:1. The upper group pursued projects--that is, extended laboratory experimentation in one direction, not involving basic research--in lieu of the regular laboratory.

Teaching materials developed to aid the implementation of the project included film loops, produced at EOC when not commercially available, and color slides of special laboratory equipment.

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[1] Tutors were selected on the basis of their interest in tutoring, their ability to communicate with students, and their achievement in previous chemistry courses.

COST

Of a total $10,061 budget, $5,280 paid the director's salary for two summers, during which time he was involved with planning and revising the program.

Services and supplies, including 135 rolls of film, a used 16mm movie camera, and an intervalometer (for filming time-lapse movies), came to $1,010.

Tutors' fees, the major ongoing cost, amounted to $1,890 annually at the rate of $1.75/hour for six student instructors working six hours/week for thirty weeks each academic year. The only other foreseeable ongoing cost would be equipment maintenance.

EVALUATION/APPLICABILITY

Standardized tests by the American Chemical Society were used to measure the effectiveness of the program against a control group, and from test results the program was considered a success. It might be noted that the study used the entire available student population in the control and experimental groups; there was no preferred selection implemented or planned. The following table gives the raw scores and percentiles on the tests administered at the end of courses.

STUDENTS

		General Chemistry	Qualitative Analysis	National Ranking Percentile for Quantitative Analysis
Control Group	(1969-70)	22.82	24.90	35th
Experimental Group	(1970-71)	27.30	33.07	54th
Experimental Group	(1971-72)	22.88	26.65	42nd

TUTORS

Control Group	(1969-70)	31.49*	21.75*	29th
Experimental Group	(1970-71)	35.71	38.73	69th
Experimental Group	(1971-72)	49.90	48.75	84th

*Score average is based on testing tutors prior to their selection as tutors.

Success of the project can also be measured by the department's decision to continue the tutorial program.

This program, or a similar one, is applicable in a situation where students have diverse backgrounds. In the specific case of a first- or second-year chemistry course the program could very easily be duplicated, given only the availability of tutorial help and a determination of what, if any, new material and equipment would be needed. The films and color slides developed by EOC would be available for reproduction, along with the outlines for special projects carried out by the students in the "higher" section.

WRITING AND LISTENING SKILLS/COMMUNICATION SKILLS TRAINING

Comm Sk 1. 100, 1. 102
Communications Skills 1, 2

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Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	X O	Community College
	O	Four-Year Institution
Level		4th year
		3rd year
		2nd year
	X O	1st year
Area	O	Science
	O	Social science
	O	Humanities
	O	Education
	X O	Technical/career
	O	Business Administration
Problem		Conceptual difficulty
	X	Diverse backgrounds
		Inflexible scheduling
		Need for personalization
		Issues ignored
		Lecture method inhibits learning
		Lack of relevance
		Loss of interest
		Realistic experience needed
		Alternative course structure needed
		Demand for theory-method consistency
	X	Other **(Negative attitudes)**
Innovative Approach	X	Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
		Media/multisensory reinforcement
		Onsite/field study
		Problem centered
		Process centered
		Simulation
	X	Tutorial/independent study
		Computer
		Programmed instruction
		Large group/small group alternation
		Other

ERIC Descriptors

Communication Skills, Writing Skills, Technical Writing, Listening Skills, Individual Instruction, Individual Needs, Motivation Techniques, Norm-Referenced Tests, Slides, Magnetic Tape Cassettes, Community Colleges

PROBLEM

Lane Community College regularly offers a course called, Communication Skills, designed to improve oral and written communication in employment situations.

Communication Skills instructors are faced with two general problems. They are confronted with students showing a wide range of communication skills and a wide range of abilities to learn the skills. They are also confronted with students who have negative attitudes toward the communication skills course. These negative attitudes manifest themselves in three ways:

1. Toward course goals: students do not perceive the goals of the course as relevant to their vocational technical interests and needs.
2. Toward teaching methodology: students perceive the means of instructing the course as ineffective or intolerable.
3. Toward themselves: students perceive themselves as unable to improve their own communication skills.

INNOVATIVE APPROACH

This project proposed the development of learning packages designed for self instruction in a laboratory setting to teaching the communication skills of writing and listening. These skills were selected as the easiest to deal with in a new program.

Principles guiding the program development were:

1. Providing materials and procedures which allowed each student to build his skills from his current rate of competence, and
2. Allowing each student to proceed at a rate optimal for his own learning.

A basic goal of the program was to overcome negative attitudes toward communication skills courses, so that:

1. Students would initiate contact with communication skills instructors over vocational-technical communication problems.
2. Students would choose this instructional alternative over the conventional course.
3. Students would persist in their lessons until criterion levels have been reached.

Project planners felt that instruction ought to be entirely individualized, that classroom units should be eliminated and individual learning packages should be provided in a self-instructional laboratory setting. Individual conferences with the instructor were made a part of the instructional mode. Assignments were based upon achievement profiles determined both by means of diagnostic tests and weekly personal conferences with the instructor as required by the packaged instruction. Grading was based upon a norm-referenced testing philosophy determined by the selection and completion of packages, rather than on a comparison of students. Should the testing criterion not be met, a modification of the teaching technique was indicated instead of failure of the student.

The use of the prescription for each student was the most important factor in term grade determination. Competitive attitudes were minimized by private instruction. Subject orientation was toward the occupational interests of the student. Visuals, games, and other nonverbal techniques were utilized.

The procedure for the development of an alternative approach showed five phases:

1. Planning
2. Collection and assessment of materials
3. Design and production
4. Implementation
5. Evaluation and report

The fourth phase, implementation, listed six primary objectives:

1. Selecting students for experimental and control groups
2. Pre-testing all students in prescribed groups
3. Assigning students to experimental or control group
4. Diagnostic testing of control group
5. Individual assignments in the experimental lab setting
6. Post-testing all students

These steps were carried out and the course was inaugurated in the Fall term, 1970.

COST

Cost of the development of this curriculum was $88,768, of which $4,476 was budgeted for equipment purchase. A school intending to adopt a similar program could expect a similar equipment purchase. Instructional materials cost $15,000 for development and purchase and included 6,000 instructional slides, production of tape cassettes, and the purchase of existing instructional materials.

Expenses for operating this program include $8 for twelve components, $26 per set of tape players and headphones (eight to ten sets for 100 students), $750 for three tapes for each taped item and storage cabinets. A $5 materials and laboratory fee per student per term can support the costs of the program other than salaries. One instructor is needed for each 125 students. A master set of materials is available for $200 and may be reproduced. Eleven tapes for the instructor's use are also available.

EVALUATION/APPLICABILITY

Evaluation data were compiled by pre- and post-testing of experimental and control groups. In addition, unobtrusive measures of student initiative--persistence in pursuing objectives, external judgments, etc.--were used. Comparison of composite measures of experimental group with control group provided evidence of extent of change in 1) skills, 2) attitudes.

An interim report covering activity from October 1 to December 30, 1970, while not offering complete data, pointed to the following indications of success:

1. Increase in enrollment,
2. Positive reaction from instructors in other disciplines, favorably impressed by effects of communication skills projects on students,
3. Improvement in the writing ability of students, as noted by project instructors,
4. Positive student response.

The communications skills program as described is now in use on five United States International University campuses as well as at Lane

Community College. The use of the program in Mexico City and in Hawaii (including Micronesian students) demonstrates its transferability and applicability to various types of students.

Packages developed or being developed using this program as a model include the following learning sets: Introduction to the Novel, a communication skills program for Micronesian students, Introduction to Literature, and United States History.

WRITING AND MATHEMATICS TUTORIAL

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Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	X O	Community College
	O	Four-Year Institution
Level		4th year
		3rd year
	O	2nd year
	X O	1st year
Area	X O	Science
	O	Social science
	X O	Humanities
	O	Education
	O	Technical/career
	O	Business Administration
Problem		Conceptual difficulty
	X	Diverse backgrounds
	X	Inflexible scheduling
		Need for personalization
		Issues ignored
		Lecture method inhibits learning
		Lack of relevance
		Loss of interest
		Realistic experience needed
		Alternative course structure needed
		Demand for theory-method consistency
		Other
Innovative Approach	X	Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
		Media/multisensory reinforcement
		Onsite/field study
		Problem centered
		Process centered
		Simulation
	X	Tutorial/independent study
		Computer
	X	Programmed instruction
		Large group/small group alternation
		Other

ERIC Descriptors

Community Colleges, Writing Skills, Mathematics, Mathematics Instruction, Autoinstructional Aids, Programed Materials, Tutoring, Study Centers, Diagnostic Tests, Small Group Instruction, Slides, Magnetic Tape Cassettes, Audiovisual Instruction

PROBLEM

Many students enter community college with deficiencies in mathematics or writing. For many reasons, they lack certain background skills that college-bound students are normally assumed to possess.

In mathematics, presently available resources are not sufficient to provide the individualized study programs necessary to build the skills of deficient students to satisfactory levels. Other students need additional resources they can turn to for further explanation about a particular aspect of a course.

In writing, the classroom situation is not conducive to dealing with individual weaknesses and deficiencies. Students in a class for poor writers are there for different reasons. When an instructor covers a problem faced by three or four class members, the remainder of the students do not benefit unless they have the same problem.

INNOVATIVE APPROACH

Mathematics

In this innovative project at Clackamas Community College, twenty-three units covering areas most often seen as learning problems were identified, including standard topics in algebra, trigonometry, and calculus. Each unit consisted of colored slides presenting a specific learning objective and accompanied by a recorded explanation of the material. Knowledge and skills gained in the laboratory were supplemented by services of a tutor in the educational services center and by standard programed materials which could be checked out.

Diagnostic testing, developed in conjunction with the modular units, aided in isolating specific weaknesses. After completion of the specified units, the student was tested again to measure his increased skills.

Writing

The Educational Services Laboratory functioned as a part of WR 111, and offered a three-part program composed of tutorial aid, small group study, and autotutorial work.

Since evaluation in writing often involves a subjective judgment about style, a rating sheet was devised to standardize as much as possible the evaluation of the writing sample required of freshmen during the first week of classes.

Once assigned to the Educational Services Lab, the student received help in small group study, where he could get instruction for a specific problem with others having the same problem. He was not permanently bound to this group, however, but was free to move on once he had mastered his difficulty.

The student received further assistance from a variety of audiovisual and programed materials available in the laboratory. A tutor or group instructor guided him to those materials which would be of most use to him. Again, the student was encouraged to progress at his own pace.

COST

Of the $10,060 budget, 70 percent was used for salaries. Two reading machines at $200 each were purchased. Packaged material for the math

tutorial cost $2,000 and for English, $500. These were one-time expenditures; all other services and supplies were college financed.

EVALUATION/APPLICABILITY

Each tutor kept a complete file on students in his charge and worked with the group instructor to determine the student's readiness for Writing II, Writing III, and Vocational Writing.

A report of the progress of all students was made by instructors at midterm and at the end of each term, showing enrollment and advancement of students as they progressed into credit courses. The Registrar's Office tabulated English and mathematics grades of students who completed suggested units of instruction. Quarterly compilations of statistics were made, and the final report (June 1971) showed student completion rates in English and mathematics in 1971 as compared to the 1969-70 school year.

The methods developed for writing and for mathematics can be applied to any course at any level. The development of packages to attack specific learning objectives is universally applicable in cases where areas can be discretely identified. In the specific case at hand, the mathematics packages developed could be copied for use in similar remedial programs at other two-year and community colleges. With modifications, they can be used at the high school or college level as well.

The Educational Services Laboratory is more problematic than the mathematics learning packages. Its testing procedures, developed especially for this program, are usable in similar remedial situations. The concept

of a three-point program involving small group study, autotutorial work and tutorial aid can be easily adapted, providing the audiovisual and programed materials and equipment are available. The most difficult part to duplicate would be an effective tutor who can confidently guide the student to the right places.

3. PROCESS CENTERED

Continuous Progress Program for Physical Science (31) p. 49

Process-Centered General Biology (32) p. 57

Three Approaches to Western Civilization (33) p. 65

United States History (34) p. 73

Related Projects:

Student-Centered Educational Psychology (41) p. 87

Methods in Reading (51) p. 111

CONTINUOUS PROGRESS PROGRAM FOR PHYSICAL SCIENCE

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GS 104, 105, 106
Physical Science Survey

Applicability			X Describes this project O Potential use of this approach
Institution			High School
	X	O	Community College
		O	Four-Year Institution
Level			4th year
			3rd year
			2nd year
	X	O	1st year
Area	X	O	Science
		O	Social science
		O	Humanities
		O	Education
		O	Technical/career
		O	Business Administration
Problem	X		Conceptual difficulty
	X		Diverse backgrounds
	X		Inflexible scheduling
			Need for personalization
			Issues ignored
			Lecture method inhibits learning
			Lack of relevance
			Loss of interest
			Realistic experience needed
			Alternative course structure needed
			Demand for theory-method consistency
			Other
Innovative Approach	X		Integrated curriculum/learning package
			Interdisciplinary/interinstitutional
	X		Media/multisensory reinforcement
			Onsite/field study
			Problem centered
	X		Process centered
			Simulation
			Tutorial/independent study
			Computer
			Programmed instruction
			Large group/small group alternation
			Other

ERIC Descriptors

Community Colleges, Physical Sciences, Continuous Progress Plan, Flexible Schedules, Concept Formation, Inductive Methods, Discovery Processes, Individual Instruction, Individual Needs, Autoinstructional Aids, Audiovisual Aids, Tape Recordings, Slides, Films, Independent Study Lecture, Student Projects, Student Research, Research Projects, Reinforcement, Multisensory Learning, Multimedia Instruction

PROBLEM

The Continuous Progress Program for Physical Science at Lane Community College was developed to meet the needs of a wide range of student learning speeds, processes, educational levels, and backgrounds. The conventional teacher-centered approach lacked the resources and flexibility to serve the diverse needs of physical science students, whose problems range from poor study skills or negative, defeatist attitudes, to boredom and lack of challenge for students who had already covered some of the material in high school.

The clearest example of this problem is the vast difference among physical science students in their ability to use basic arithmetic.

Identified needs were an improved method of learning concepts, an increased number of learning methods, and a flexible learning pace. A means of individualizing the methods and the pace of learning, a mechanism for efficient internalization of learned concepts,[1] and reduction of the anxiety factor related to competition are all needed in a new teaching method.

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[1] An example of what is meant by efficiency in the internalization of learned concepts: an instructor presents a concept complete with diagrams and a full explanation. The student hurriedly copies this, nodding his mental consent because he understands this idea at this moment. However, as time passes, the mental picture of the explanation fades to the extent that two hours later it is only a blurred remnant. The student was not forced to go through the processes of forming his own mental picture.

INNOVATIVE APPROACH

The project allows self-discovery as a means of improving understanding of concepts. Self-discovery enables inductive learning to occur by causing active performance of the conceptual process. The concept becomes a part of the fund of knowledge in the brain.

To meet the diversities of method needed by the students, the course provided a variety of materials and methods including alternative written resources, slides, tapes, films, film loops, taped and live lectures, and individual projects.

Flexible pacing was achieved by rejecting the conventional, fixed, one-term time schedule required for course completion. Students were allowed to finish the course as quickly as possible; or they could take up to one year for one term's work.

This approach uses some multisensory reinforcement techniques and identifies the inductive process as an efficient technique for conceptual understanding. Individualized learning management is the theoretical base for part of this project's approach, with the student identified as the manager of his own learning and the instructor serving as a technical assistant.

The Continuous Progress Program had these stated objectives:

1. Provide optional paths by which the student may pursue the required subject matter;
2. Challenge the more advanced student to go further in the work by making appropriate exercises and materials available;

3. Encourage the slow learner by moving him out of the traditional class structure where he is continually and negatively compared with others for whom learning comes more easily;
4. Eliminate the need to "second guess" the teacher regarding concepts and principles which will be covered in tests;
5. Permit unlimited repetition of tests;
6. Schedule frequent screening of audiovisual and video materials;
7. Permit special projects and/or thought problem activities in lieu of taking a unit test;
8. Inform students of the continuous progress approach taken in this course and the available options and materials;
9. Conduct mandatory orientation meetings and optional help sessions, discussions, seminars and, as the demand arises, lectures.

The project was accomplished over a period of twenty months, February 1970 to October 1971. The project compiled and programed reading, audio and video materials, tests, and special student projects into teaching units. These materials were made available in a Learning Resource Center, Study Skills Center, and the classroom.

The gathering of materials lasted throughout the twenty months' duration of the project. Course materials and methods for the three-term physical science survey classes were revised and tested for effectiveness.

Students attended mandatory orientation meetings, plus optional help sessions, discussions, seminars, and as the demand arose, lectures on various topics. Each student met with an instructor at least once a month

to discuss the student's progress, address any problems and questions which had arisen, to monitor student progress, and to become better acquainted personally.

Students performed each teaching unit[1] through their choices of methods from among:

1. Study skills center--audiovisuals, maps, outlines, tapes, etc.
2. Laboratory
3. Programed texts and books of various reading levels
4. Consultations, seminars, lectures
5. The college Learning Resources Center dial retrieval system--audio and video materials
6. Tests, projects

Each unit could be accomplished at the student's rate.[2]

COST

The $17,900 budget allocated $14,100 for professional salaries and purchased $2,000 of equipment, including three Super-8 Film Loop Projectors, eleven slide projectors, three tape cassettes, and a number of screens, tapes, and trays. Five 16mm films costing a total of $900 were also part of the equipment purchase. It is to be assumed that with proper maintenance this equipment will continue to serve students.

In addition, $1,700 was spent on the acquisition of instructional materials. This included the production of slides, film loops, film, the

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[1] A self-contained unit organized around specific topics and concepts.
[2] Tests or alternatives (projects) were accomplished as certification of completion of each teaching unit.

purchase of programed texts and charts, and rentals of films. The remainder of the budget covered communications, duplication, and travel fees.

About eighty students per term used this program, a total of 240 for the year. The cost per student thus came to about $75. Since LCC has decided to offer the program in the future to all physical science students (about 270), the costs per student will decrease drastically, in spite of additional costs incurred in making necessary program revisions.

A school with a central campus resource center would possibly not need to develop a departmental center. This omission would mean a considerable savings, although separation of written and audiovisual materials would occur. Interaction among students might be reduced but could remain substantial, depending on the space arrangements and flexible attitude of resource center staff.

EVALUATION/APPLICABILITY

The project identified the crucial problems and defined a promising approach to solutions. Proposed efforts were designed to promote flexibility of pace and method but with a definite and measurable student objective. The effectiveness of conceptual learning was to be improved. Self-discovery, the actual performance of the internal conceptual process, was considered the key to effectiveness.

General goals and methods of achievement of goals were clear and potentially effective. However, planning was not equal to the task. The project needed a specific program design tied to the goals and methods.

Without such a design, the project lost time and effort because of ambiguity of direction and objective.

Self-discovery was not utilized as much as had been planned. Staff and time limitations made it necessary to continue to provide considerable amounts of traditional structure.

The major impact of the project was on the presentation approach now being used by the Physical Science Department. That is, a comprehensive redefinition of teaching method is now in effect and has been demonstrated to improve learning and provide a more positive learning environment.

A significant product appears to be the shift in motivation which occurred among students. The student-centered approach now in effect indicates that students have greater interest in learning itself than they had when the traditional teacher-centered approach was used.

The major area of needed work appears to be in development and organization of materials which are to serve as learning tools. For example, student use of slides, and requests for tapes to accompany slides, have resulted in purchase of additional materials in this area.

The project has gathered and developed a variety of slides, films, film loops, tapes, and written text and reference materials programed by teaching units. These materials are available to and suitable for physical science survey courses.

A school wishing to implement this project would need to define its own course goals and identify the specific learning aids which could implement these goals. The Continuous Progress Program design and materials are useful for review and potential use.

PROCESS CENTERED GENERAL BIOLOGY

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GS 101, 102, 103
General Biology

Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	O	Community College
	X O	Four-Year Institution
Level		4th year
		3rd year
	O	2nd year
	X O	1st year
Area	X O	Science
	O	Social science
		Humanities
	O	Education
	O	Technical/career
	O	Business Administration
Problem		Conceptual difficulty
		Diverse backgrounds
		Inflexible scheduling
		Need for personalization
		Issues ignored
	X	Lecture method inhibits learning
		Lack of relevance
		Loss of interest
	X	Realistic experience needed
	X	Alternative course structure needed
		Demand for theory-method consistency
		Other
Innovative Approach		Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
		Media/multisensory reinforcement
		Onsite/field study
		Problem centered
	X	Process centered
		Simulation
		Tutorial/independent study
		Computer
		Programmed instruction
		Large group/small group alternation
		Other

ERIC Descriptors

Biology, Biology Instruction, Activity Learning, Experiments, Student Research, Student Projects, Behavioral Objectives, Group Instruction, Discovery Processes

PROBLEM

A comparison of three learning approaches was made by the Department of General Science at Portland State University to determine which approach might prove most useful in the general biology course. They were:

1. Content-centered or traditional course
2. Autotutorial, a self-instructional approach to content-centered curriculum
3. Process-centered

The three approaches were measured against the following criteria:

1. Communication of knowledge concerning the biotic environment of man and the communication of knowledge concerning man himself .
2. Development of scientific attitudes appropriate to existence in our science-oriented society
3. Development of problem-solving abilities
4. Development of an interest in biology

Based on comparative results, the process-centered approach was selected to innovate a new program at the university.

Basically, the process-centered approach was designed to maintain levels of knowledge achieved by other techniques, while increasing the students' scientific attitudes' level, problem-solving ability, and interest in the course.

Inherent in this instructional change from content to process is the potential for loss of content learning through loosening of the course structure and failure to achieve the process objectives because of insufficient replacement

of structured lecture and laboratory with a clear, goal-directed substitute. That is, the removal of one anchor--highly structured course content and procedure--must be compensated by the addition of another anchor. Clear goal directedness is one such anchor; however, some orientation of students is required to make this new kind of structure effective.

INNOVATIVE APPROACH

The process-centered course was implemented to encourage inquiry and experimentation. The approach used dynamic learning processes and goal-directed analytical thinking directed toward maximum understanding and assimilation of content and process involved in biological concerns.

A group approach was taken to inquiry, definition of problems of identification, and selection of alternatives. Biological problems were defined in group inquiry in an environment of exchange of ideas and questions. Possible hypotheses and research design solutions were devised in group seminars, and laboratory experiments were conducted to prove chosen solutions.

Three instructional methods were employed in the course:

1. Lecture was designed to inspire or incite students to greater efforts in reading, small group discussion, and process-centered laboratories. Tests were on assigned reading rather than lecture information.
2. Small group discussion was utilized for group definition of biological problems with potential laboratory solution, and graded by mutual decision of student and instructor.

3. Laboratory work enabled the student to develop and conduct his own research design toward group-selected problems and solutions. Grades were given on investigational activities and written papers.

The process-centered course at Portland State enrolled 225 students, separated into groups of fifteen each, who attended small group discussions and laboratory together. As opposed to the traditional course's two lectures and one two-hour laboratory per week, the process-centered course offered students one lecture, one small group discussion and one two-hour laboratory. The first term of the course was devoted to Environmental Biology, the second to Org ic Biology, and the third to Cellular Biology.

The following process-centered laboratory procedures were outlined for students both in writing and orally:

1. Students should discover and read library materials related to topics under investigation in the laboratory.
2. Students should collect specimens from the field and prepare cultures in the laboratory; standard reagents available in the laboratory should be used when considered appropriate; prepared slides should be requested when needed.
3. Unless a previous day's studies paved the way for continuing study, a laboratory session began with an instructor-led discussion encompassing these points:
   (a) statement of some basic problems related to a given concept,
   (b) statement of student hypotheses for solutions to the problem,

(c) voluntary student reports on library readings if readings were especially pertinent to the stated problems.

4. Using materials available in the laboratory or contributed by students, students should devise their own procedures for testing hypotheses.
5. The last part of laboratory periods was devoted to student discussions of laboratory findings. Findings were then contributed to acceptance, rejection, or refinement of student hypotheses.
6. At the beginning of the next laboratory session, students presented their instructor with written reports on problems, hypotheses, procedures, and findings.

Tests were administered to assess the level of achievement of the four project objectives, and results were compared with those of autotutorial and traditional instructional methods.

COST

The budget for this project was $6,398. The director's salary was $3,580 during the period he was involved in planning and evaluating the project. Equipment to furnish three student research centers for the process laboratory cost $1,700.

The process-centered method at $29-$56 per student was more expensive than traditional or audiotutorial instruction. However, results indicated that process-centered biology was an effective program.

Some stretching of schedule, such as a biweekly discussion, might be appropriate, but it could threaten reduction of intellectual and personal interaction and defeat the basic goal of inquiry.

EVALUATION/APPLICABILITY

Achievement of course objectives was measured by three instruments:

1. "Biological Sciences Curriculum Study Comprehensive Examination" (for objectives 1 and 2)
2. "Watson Glaser Test of Critical Thinking" (for objective 3)
3. "Interest Inventory" (for objective 4)

Results indicated that process-centered biology was an effective instructional program. Pre- and post-test results were correlated with a variety of demographic, value preference and performance data, as well as data from students in the autotutorial and traditional course approaches.

A high percentage of "incompletes" indicated the need to counsel some students and perhaps shift other students to alternative approach sections. Students tended either to do very well or to do very poorly in the process-centered course.

The approach taken to process-centered biology is applicable in a broad spectrum of subject areas to increase learning of scientific attitudes, problem-solving abilities, and interest through self-discovery, induction, and experimentation.

Additional work should be undertaken to help floundering students to function effectively or to choose other instructional methods. Close attention to getting students motivated is necessary.

Because the course requires more work per credit hour than a student can reasonably be expected to accomplish in a full schedule, some reduction in writing tasks might be advisable. A shortened, modular course could alleviate both this problem and the cost problem but still maintain course goals.

THREE APPROACHES TO WESTERN CIVILIZATION

Hst 207, 208, 209
Origins of World Civilization
Western Imperialism, Century of World Crisis
Hst 101, 102, 103
History of Western Civilization

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Applicability			X Describes this project O Potential use of this approach
Institution			High School
		O	Community College
	X	O	Four-Year Institution
Level			4th year
			3rd year
	X	O	2nd year
	X	O	1st year
Area		O	Science
	X	O	Social science
		O	Humanities
		O	Education
		O	Technical/career
		O	Business Administration
Problem	X		Conceptual difficulty
			Diverse backgrounds
			Inflexible scheduling
			Need for personalization
			Issues ignored
			Lecture method inhibits learning
			Lack of relevance
	X		Loss of interest
			Realistic experience needed
	X		Alternative course structure needed
			Demand for theory-method consistency
			Other
Innovative Approach			Integrated curriculum/learning package
			Interdisciplinary/interinstitutional
			Media/multisensory reinforcement
			Onsite/field study
	X		Problem centered
	X		Process centered
			Simulation
			Tutorial/independent study
			Computer
			Programmed instruction
			Large group/small group alternation
			Other

ERIC Descriptors

History, History Instruction, Western Civilization, Non-Western Civilization, Interdisciplinary Approach, Discussion Groups, Independent Study

PROBLEM

At the University of Oregon, as at many universities, students had lost interest in the History of Western Civilization course. Enrollment in the course decreased 40 percent after 1965, although total attendance at the University increased.

History department members felt a strong commitment to the course in spite of trends that appeared to be working against it: increasing specialization of historians, changing sensibilities of undergraduates, and sophistication of some high school backgrounds.

The fact that pressing social problems were diverting students toward applied social sciences could not be regretted. Nevertheless, it was felt that students still needed a sense of history to give them a perspective of social development in addition to an awareness of the range and limits of human achievement.

INNOVATIVE APPROACH

To keep the Western Civilization course from fading into oblivion, a combination of three approach options was designed.

1. Western Civilization Survey, the conventional approach, relied on lectures, readings, and discussion groups to give students an understanding of the western world's history and culture. Major emphasis was placed on institutions and values which unfolded from Greek and Hebraic origins.

2. Western Civilization in Perspective of World History compared western and non-western traditions. An interdisciplinary approach combining anthropology, comparative religion, philosophy, and history was used to differentiate western civilization from others.

3. Studies in Western Civilization concentrated on selected topics, such as law, science and religion, to show students the complexity of historical process. A general lecture introduced topics, using several disciplines to focus on different aspects of history. Discussion sections formed the program's core, with students giving individual reactions to documents and interpretive works. To encourage independent inquiry, some seminars dealt exclusively with one topic; others included special areas selected by groups.

Extensive research was required to structure topics in the two new options. Because staff could not rely on existing texts after topics were established, new materials were located. Articles ranging from detailed historical studies to discussion of broad concepts were duplicated and placed on reserve in the library.

Materials explaining the purpose of the three courses were disseminated, and counseling was provided to make students aware of the course option which best suited individual needs.

After options were selected, a concept examination was administered during the first week of classes, to test students' level of historical sophistication. The examination's separate parts (economics, politics, etc.) offered a more descriptive profile than did a combined test. Thorough analysis of test results,

seeking correlation between student ability and the type of course chosen, indicated little connection between the two.

At the end of the course, the test was again given to measure development of students and correlate results with options chosen.

COST

Approximately 40 percent of the $13,300 grant was used for development. Most of this amount paid for release time of the project director and part-time services of another faculty member. About $1,000, or 25 percent of the development cost, was spent to duplicate resources for the two new options and to purchase maps.

Remaining funds, approximately 60 percent of the total grant, were used to implement the program. Most of this was used to pay a half-time salary for the project director; part was paid to a graduate student.

EVALUATION/APPLICABILITY

Enrollment throughout the three terms was good, perhaps the surest sign of student satisfaction. Students appreciated being able to choose from among options based on individual needs and interests.

Students in the most innovative option, Studies in Western Civilization, found the unstructured approach and sophisticated material challenging but not impossible. They responded well to the demands for self-motivation and participation because they had sought that kind of a course and were ready for it.

Another important sign of the success of offering options was the History Department's decision to continue the principle in the coming year. Western Civilization in World Perspective was revised, the conventional course continued, and the small group principle implemented by offering students in the lecture classes two additional hours of credit for seminars combined with intensive individual research.

The concept examination administered at the beginning and end of the course showed little correlation between entering score and option chosen or between improvement achieved and course taken. These results, which at first glance seem disappointing, can be further analyzed. The first lack of correlation suggests that the course chosen had little to do with previous knowledge--perhaps student interest was a more important factor than student ability. The second lack of correlation could have several explanations: the courses may have equally encouraged development of historical knowledge, or, as the project director suggested, the test may not have been a good measure of growth. The examination was an important beginning in analyzing student choice and performance because it clarified the limits and goals of future testing.

The careful preparation of the tests gave the teachers a more descriptive profile of the students than they had hoped for, and provided an excellent indication of the class level and of the approach best suited to the class.

The success of the University of Oregon project indicates that other traditional courses can benefit from its implementation. Offering optional variations of an introductory course can revitalize the traditional curriculum.

In duplicating the History of Western Civilization project, other schools (or departments) can utilize the project syllabi to establish the content. As developed at the University of Oregon, the project is appropriate for large numbers of students. Highly motivated, self-directed students should be encouraged to register for the small group discussions.

The University of Oregon development phase required, besides the project director, the part-time services of a faculty member. Operation utilized a graduate student in addition to the director.

Probably no additional staff would be required in duplicating the project, but the project director might want relief time for analyzing the materials and fitting them to his school's needs.

UNITED STATES HISTORY

Hst 201, 202, 203
History of the United States

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Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	X O	Community College
	O	Four-Year Institution
Level		4th year
		3rd year
	X O	2nd year
		1st year
Area	O	Science
	X O	Social science
	O	Humanities
	O	Education
	O	Technical/career
	O	Business Administration
Problem	X	Conceptual difficulty
		Diverse backgrounds
		Inflexible scheduling
	X	Need for personalization
		Issues ignored
	X	Lecture method inhibits learning
		Lack of relevance
		Loss of interest
		Realistic experience needed
		Alternative course structure needed
		Demand for theory-method consistency
		Other
Innovative Approach		Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
	X	Media/multisensory reinforcement
		Onsite/field study
		Problem centered
	X	Process centered
		Simulation
		Tutorial/independent study
		Computer
		Programmed instruction
	X	Large group/small group alternation
		Other

ERIC Descriptors

History, History Instruction, Concept Formation, Concept Teaching, Inductive Learning, Student Motivation, Student Participation, Group Instruction, Group Discussion, Lecture, Course Organization, Audiovisual Aids, Audiovisual Instruction, Films, Large Group Instruction, Community Colleges

PROBLEM

Rising numbers of college students and increasing costs per student have led to very large classes. Several problems due to class size arose at Lane Community College. 1) Interpretation and conceptualization from factual materials were inadequately gained in large classes. This situation is particularly disadvantageous to students who transfer to four-year institutions and who therefore need concept-oriented coursework. 2) Large classes threatened the Lane Community College philosophy of a close student-faculty relationship. The projected result was a decrease in quality of teaching and a loss of the student-centered orientation. 3) Student motivation and perception of course relevance were increasingly lost because of the impersonality of large classes and low student-teacher contact. 4) Teacher motivation and attention to subject matter and student needs also diminished as class size increased and contact decreased.

Student-teacher contact has been the principal device for teaching students about processes: analysis, relationships, and conceptual framework. Course content usually emphasizes factual material with little explicit attention to concept and interpretation. Conceptual thinking is dynamic; it requires the feedback which dialogue allows. The necessity for large classes has diminished the dialogue and therefore frustrated student and teacher conceptual learning efforts.

INNOVATIVE APPROACH

In response to these problems, new means for developing student conceptual processes and building student motivation were designed for the United States History course.

The project incorporated into one course the advantages of efficiency and economy inherent in the large class and the personal involvement--including increased teacher-student contact--inherent in the small class.

Several ideas for improving student conceptual and interpretive learning were developed. Project developers researched literature on the effect of different teaching methods (lecture, discussion, class size, etc.) at the college level and found that no significant differences could be expected in student performance on tests or in grades. Therefore, flexibility in instructional methods choices was considered to effect no deleterious results when measured by traditional methods of assessing achievement.

With these data, project developers felt free to design a program of instruction which would improve morale, effectiveness, and efficiency.

Effectiveness, to the developers, meant student achievement of the following instructional objectives:

1. Knowledge of historical process (cause and effect relationships) and historical complexity (multicausal relationships).
2. Mastery of historical concepts.
3. Ability to recognize and describe the nature of certain basic themes in American history and the relationship of these themes to historical periods.
4. Understanding of the relevance of these concepts, relationships and themes to America today.
5. Ability to read carefully and critically.

6. Ability to use the tools of a historian, including interview, original source materials, application of "rules of evidence," and techniques of organization and presentation.

Four techniques were designed to improve morale, effectiveness, and efficiency:

1. Alter the formal lecture structure of the large class,
2. Establish a well-directed and profitable discussion group utilizing the creative abilities of students,
3. Offer a variety of learning experiences,
4. Increase teacher efficiency and effectiveness through scheduling alternatives eliminating repetitive class and preparation hours.

Mondays and Fridays, 50-minute meetings of 500 students were conducted. Presentation methods were varied and included informal, loosely structured techniques, dialogue, diagrams, maps, outlines, audiovisuals, and formal structures. The following results were found:

1. Since tests were linked to lectures, long periods of informal, loosely structured lectures adversely affected student morale.
2. Dialogue was effective to get the class intellectually "involved," but only a few students could participate.
3. Loose, informal lectures could be used more often if diagrams, outlines, or maps were used; students preferred the informal atmosphere as long as clarity and structure were preserved.
4. A change in methods from time to time during the course was beneficial to student morale as long as performance security was preserved.

Planning for lectures, whether tight or loose, formal or informal, was found to be essential and inadvertently jeopardized by the tendency to channel instructor time into the discussion aspect of the course. In particular, the training of discussion group leaders tended to pull instructor time away from lecture planning.

During the first term of operation, it was discovered that a "unit" approach was very effective in maintaining student morale and achieving instructional objectives. The "unit" approach meant spending more than one week on a single "theme" (e.g., American Revolution, Civil War) and dealing with the theme from several points of view (e.g., interpretive history, single causation, political science, the science of revolution). One major topic, the Civil War, comprised a five-week unit developed in response to this discovered advantage and permitted focus on nearly all the course objectives (e.g., causal relationships, concepts, themes and contemporary relevance).

The project proposal had contained a plan to provide advanced study and study skills sessions on Fridays of alternate weeks. This objective was not implemented for two reasons: Lane Community College already had a well-developed and well-staffed study skills program, and the plan might seem discriminatory--dividing the class into "bright" and "slow" students--to the detriment of overall morale.

Thus, Friday sessions became a supplement or complement to the Monday sessions, and a focus for variety: films, guest lectures, panels, testing, question and answer. After Fall term (term 1), the Friday informal talk and the question-answer portions were deleted because Fall questionnaires

indicated that these devices were too unpredictable and were perceived by students as unproductive.

Several supporting facilities and materials were employed including:

Audiovisual aids

For both structure and variety, audiovisual aids were used each term but with uneven results. Films were the biggest problem. Good historical films were unreproducible because of copyright laws. Available films were mostly limited to those from the Lane County Intermediate Education District film library. Unfortunately, there were too few of these films for the class needs. Student-made films are a good potential resource if a file of such films can be constructed.

A 20-minute, student-made film, taken with modern documentary techniques from old photographs and paintings, and set to a recording of Stephen Vincent Benet's epic poem, John Brown's Body, was of a quality, impact, and effectiveness which far exceeded most other films. Another film was made Spring term and both are now available in the Social Science Department.

Construction of these films cost a combined total of approximately $95. Film rentals run from a low average of $10 rental each ($30 per term for three films) to $25-50 rental each ($300 purchase) for good Life magazine or Rand McNally films produced in the last five years. These latter have about the same impact capability as the student-made films.

An additional value was realized by the student film-making project--some students were stimulated to become involved in the project, who ordinarily might not have been interested in the subject generally.

Handouts

Printouts or handouts proved to be more of a detriment than a help unless:

1. No other form of conveying the information would do the job better,
2. They were brief and quickly read,
3. They were prepared for economy in conveying the information and for visual impact,
4. They were used at the same time and in the same class as the one in which they were handed out.

In the class, the best handouts were diagrams or tables referenced to the lecture. In the small discussion, the best ones were short quotes from an original source.

However, student evaluation of these materials was less positive than the instructor's evaluation. Overhead projection of transparencies seemed to increase the effectiveness of such reference materials by increasing student interest and focusing student attention on the same material at the same time.

Tests

Student morale was most threatened in testing. This finding is paradoxical because testing and grading are the major anchors used by students to maintain their feeling of security, the loss of which is a major threat to morale.

This dilemma of creativity, morale, looseness, security, testing, and grading is one which both traditional and innovative instructors have faced. Testing and grading have become predictable mechanisms to students and

therefore impart the security of their predictability as a counter to the threat posed by this external measurement device. It is, however, destructive to student morale to be tested basically and largely on factual material, which limits expression of creative relationship and synthesizing abilities. But, in the absence of the structure provided by such tests, morale also suffers. Several needs are implied: to legitimize to the student, to the instructors and to the general system, dynamic learning processes and directed thinking efforts, and to stabilize new assessment techniques so they are predictable in the student's mind.

The project considered an assessment innovation whereby students would be graded on the basis of the number of instructional objectives[1] which they had acceptably achieved. This approach was not taken, however, because the objectives had not been pre-tested and additional preparation needs might be excessive.[2]

The Small Class-Peer Discussion Group

Whereas the purpose of the large class was primarily to provide a variety of group educational experiences, the purpose of the small class (discussion group) was to provide an opportunity for individual educational experiences. The assumptions were:

1. Students gain confidence in their ability to master the material if they can inquire about and discuss problems of comprehension among their peers.

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[1]Refer to list of instructional objectives given earlier.

[2]A feasible plan is now available in "Systems Approach to Western Civilization," Junior College Journal, March, 1971, pp. 72-80.

2. Well-directed use of original sources, chosen to lead students inductively to basic themes, concepts, and events, is most effectively accomplished in small group discussion.

3. Peer exchange and group association would improve attitude and reduce anxiety.

4. Students could be sufficiently trained in course content and teaching techniques to perform the role of discussion leader. Students were selected as discussion leaders on the basis of age, year in college, academic major and performance level or grade point average (GPA) and through interviews, on personality, emotional stability, enthusiasm, communication abilities, articulateness, and whether the student planned to stay in the class a full year.

Continuity was considered important and was successfully achieved with only one dropout from the leadership group. Three additional leaders were added during winter term when enrollment expanded. Thirteen leaders provided eleven groups and two substitute leaders.

Considerable planning was done to design a training program for the discussion leaders. Instructors wishing to use this method should consider a summer training session for leaders.

COST

Cost of this project was $10,804 and, with the exception of $500 budgeted for computer use, went entirely to pay personnel salaries. Much of the personnel cost went toward the payment of an Assistant Professor of Education and a Teaching Assistant in Education who added the perspective

of their areas of specialty to assure the educational viability of the project. The institution arranged for college credit to be given discussion leaders.

EVALUATION/APPLICABILITY

Self evaluation was carried on throughout the year in United States History, though in no absolutely systematic way.

A grade distribution of the innovative group was compared to the grade distributions of past traditional sections, and though the results could inadvertently have been influenced or affected by the instructor, students did perform better than in previous years.

Several "head counts" of students attending lectures were made and compared with enrollment lists. Attendance was not found to be significantly better.

The most important piece of evaluation data according to project directors was a student questionnaire which was passed out four times over the three-term duration of the course. This questionnaire was not required of students, but it was found that respondents did comprise a representative cross-section of students enrolled in the course. The project's final report discusses the responses to the questionnaire with great thoroughness. In general, students can be said to have reacted positively to the innovative course.

The application of this project would probably take place much more in terms of concept than in terms of specific materials. The inclusion of educators in the development and operation of the U. S. History sequence, as

well as the commitment of the project director to improving the project, make this project very interesting for a person who might possibly carry out a similar instructional approach. The final report for this project provides an extensive discussion of the specific problems and solutions encountered by project planners, as well as a sober evaluation of its strengths and weaknesses.

4. COMPUTER AND SIMULATION

Student-Centered Educational Psychology (41) p. 87

Simulated Law Enforcement Experience (42) p. 97

Computer Business Simulation (43) p. 103

Related Projects:

Individualized Curriculum for Electronics (81) p. 193

Industrial Engineering and Data Processing Technology (61) p. 129

Integrated Geography (85) p. 229

STUDENT-CENTERED EDUCATIONAL PSYCHOLOGY

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Educational Psychology
Ed 312 (Oregon State University)

Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
		Community College
	X O	Four-Year Institution
Level	X O	4th year
		3rd year
		2nd year
		1st year
Area		Science
	O	Social science
	O	Humanities
	X O	Education
		Technical/career
		Business Administration
Problem		Conceptual difficulty
		Diverse backgrounds
		Inflexible scheduling
		Need for personalization
		Issues ignored
		Lecture method inhibits learning
	X	Lack of relevance
		Loss of interest
		Realistic experience needed
		Alternative course structure needed
	X	Demand for theory-method consistency
		Other
Innovative Approach		Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
		Media/multisensory reinforcement
		Onsite/field study
		Problem centered
	X	Process centered
	X	Simulation
	X	Tutorial/independent study
		Computer
		Programmed instruction
		Large group/small group alternation
		Other

ERIC Descriptors

Educational Psychology, Student Centered Curriculum, Creativity, Concept Formation, Discovery Processes, Simulation, Field Studies, Field Trips, Teacher Aides, Large Group Instruction, Small Group Instruction, Individual Needs, Teacher Education, Teacher Interns

86/87

PROBLEM

A survey of the opinions of educational psychology students at Oregon State University in the spring of 1968 revealed widespread dissatisfaction with the lecture method of instruction. Lecture instruction was criticized for its failure to actualize the very methods which were implied or advocated in the course content. Instructors talked about various teaching approaches, but they demonstrated only lecture or lecture-discussion approaches.

The lecture method was specifically criticized for its lack of student participation and the apparent lack of concern for student interests and opinions. It seemed to deny students access to important dynamic learning processes and consequently diminished the learning.

INNOVATIVE APPROACH

The basic countermeasure was the development of a student-centered program. Some learning processes would be activated in a student-centered approach which are not activated in a lecture, or a teacher-centered approach. Advantages of the student-centered approach were listed:

1. Creativity, or maximization of alternative theories, would improve, enhancing the range and depth of thought;
2. Reduction of hostile behavior would occur as external constraints were reduced;
3. The opportunity for exploration would allow self-discovery, improving the internalization and understanding of concepts.

Simulation was an important element of the approach. The operation of the educational psychology classes would represent learning by a method which is taught in educational psychology. Learning by doing would increase learning and would foster improved comprehension of the strengths, weaknesses, and consequences of various approaches to learning.

Course content would not be directly affected by this project; method of presentation of content was the focus of the innovation. Carl Rogers' philosophy of education, as presented in his book, Freedom to Learn, was the approach used.

Five educational psychology instructors agreed to test Carl Rogers' Freedom to Learn teaching method in their courses. They outlined the philosophical hypotheses advanced by Rogers and devised course procedures which were consistent with procedures recommended by Rogers. Rogers' hypothesis is that learning improves in an environment where the student directs the goals and objectives of the course, determines his own method of pursuit, and defines his personal goals for the course.

To actualize the innovative approach, a process was defined which would

1. Allow students to plan the course with the guidance of the instructor,
2. Assist the student in developing his own theory of learning,
3. Allow the student to learn the content of educational psychology, including:

learning	counseling
motivation	current trends in education
discipline	retention of material
classroom atmosphere	transfer of training

4. Provide an opportunity for students to discover information about themselves (personal development).

5. Help students develop a more positive attitude about themselves as prospective teachers.

6. Provide field experiences for students in the form of field trips, classroom observation, and participation as teacher aides.

The staff worked with students in large and small sectional meetings to assist each student in determining his goals for the class. The staff provided information, arranged appointments for field trip scheduling, and functioned generally in a consulting role.

Students were urged to develop individual contracts for the work each expected to cover during the course. They were also encouraged to examine personal values which relate to teaching.

Class sections suggested such large and small group exercises as were judged desirable. Information on the use of library materials and other resources (audiovisual, human, etc.) was presented as desired by individuals or groups.

COST

The budget of $4,772 comprised three major expenditures: $2,192 for clerical assistance for two terms (six months); $1,700 for student field trips (Tongue Point Job Corps, Aloha High School, Blind School, Chemawa, Adams High School, Portland Metropolitan Learning Center); and $900 for instructional supplies including paper, film rental, and evaluation instruments.

Costs are variable depending on several factors. Existing course content may need to be rearranged; or the presentation of materials may need to be different. The learning philosophy decided upon and the method of presentation of materials would determine necessary changes, if any. Costs are minimal in the approach used at OSU, requiring only time for conferencing; time for selection and arrangement of course format and materials; and time for design of testing for achievement, self-concept, and attitude toward self as a professional.

If the innovation requires a complete rewrite of materials, such as a laboratory or field-work course, then costs will be greater. Possible expenses are faculty, clerical, and technical assistance (including student) to rewrite instructional materials, field-trip expenses, or equipment (multimedia, laboratory, etc.).

EVALUATION/APPLICABILITY

"Student Centered Educational Psychology: An Experimental Approach" directly addressed points which were considered in many of the innovative instructional methods projects. A consequence of this directness is that comparative achievement goals of conventional and innovative courses are seen in bolder relief. Specifically, three of the five project investigators felt that factual information was not the most important outcome of the course.

The significance of the question of learning factual information versus learning other aspects is that it implies a need to rework course objectives and, especially, to evaluate and revise the achievement testing if factual

information is not the most important outcome of the course. Other possible outcomes are:

1. Effect on career choice and career goal directedness of students,
2. Increase in the scope and depth of the students' creative approaches to projects,
3. Increased worth and intellectual excitement of student projects.

The course was wisely conducted by identifying and using the specific operational methods which had to be followed in order to implement the course. A difficulty often encountered in an attempt to innovate is that specific, needed operational guidelines are unknown or indefinite. Therefore, an innovative project may suffer from a handicap not endemic to conventional courses, where procedures are well known and refined through time. Innovative courses must, therefore, give close attention to the design and implementation of specific course methods.

Evaluation of this project tested student knowledge of course content, student self-concept, and student self-image as a future competent teacher. Test data revealed no significant difference in knowledge of course content between the target population and the control population (nonexperimental educational psychology classes).

However, tests used to measure knowledge may have been measuring the wrong things. They may have measured the knowledge goals of the traditional course and not the knowledge goals or conceptualization goals of the experimental course. It is difficult to test achievement in an innovation of this kind. Achievement may be experienced in different substantive areas from those of the conventional course and may be expressed differently.

The ability to theorize from factual data may be considered a course achievement goal; if so, then ideally that ability should be measured before and after the course and compared with similar control group data. For example, student theoretical use of factual material may be enhanced in an innovative course of this sort, while the factual material learned may remain the same or diminish. The important thing here is to decide what it is that you want the students to learn and then determine how to measure the achievement of that objective. Even the semantics of test questions may be closely tied to conventional methods of teaching (we have had years to refine our thinking about conventional methods) and inappropriate to the new material or new approach being tested.

The knowledge goals of the experimental course had more to do with understanding the implications and applications of course content than did the traditional course. So if the experimental course directed student effort differently from the traditional course, then measurement of traditional knowledge as defined by the traditional course would not mean anything. Student effort would be less directed toward the knowledge goals of the traditional course and could, therefore, be expected to reap less of that knowledge.

Two of the most important planned outcomes were improvement in clarity of student goals and improvement in students' attitudes toward themselves as future professionals. Student ability to communicate knowledge effectively and to act as self-assured models for their future students did apparently improve.

It was hoped by the five project developers that this project would, in conjunction with an experimental education course, Education 101X, provide a model which would change the entire teacher training program at Oregon State University. It is doubtful that this was accomplished. Faculty in the department did not share a consensus on the student-centered approach to instruction; tested achievement did not improve as a result of the experimental course; and, therefore, evidence to persuade those who do not already favor a student-centered approach is lacking.

Duplication of this project is easiest in psychology or sociology departments including education department courses in these areas. These areas have more of the knowledge needed to develop a course process according to a particular learning philosophy. Many individuals in other fields, however, are very conversant in learning philosophy. Therefore, the use of a particular philosophy or theory as the guideline for course process is feasible in any department. Conferencing of department members, as was done in this project, can be a productive technique for course development. Approaches and techniques can be exchanged and refined in conference, a plan developed and subsequently implemented.

Since this project was directly addressed to the testing of an innovative learning philosophy which contains some of the same ideas which other projects have used and tested indirectly, the self-evaluation report written by the project director may be very valuable to faculty interested in the approach. The final report of the project is a concise abstract of the rationale, objectives, process, and evaluation of the project.

SIMULATED LAW ENFORCEMENT EXPERIENCE

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LE 5.286
Police Operations Experience Laboratory

Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	X O	Community College
	O	Four-Year Institution
Level		4th year
		3rd year
		2nd year
		1st year
Area		Science
		Social science
		Humanities
		Education
	X O	Technical/career
		Business Administration
Problem		Conceptual difficulty
		Diverse backgrounds
		Inflexible scheduling
		Need for personalization
		Issues ignored
		Lecture method inhibits learning
		Lack of relevance
		Loss of interest
	X	Realistic experience needed
		Alternative course structure needed
		Demand for theory-method consistency
		Other
Innovative Approach		Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
	X	Media/multisensory reinforcement
		Onsite/field study
	X	Problem centered
	X	Process centered
	X	Simulation
		Tutorial/independent study
		Computer
		Programmed instruction
		Large group/small group alternation
		Other

ERIC Descriptors

Community Colleges, Simulation, Dramatic Play, Role Playing, Video Tape Recordings, Group Discussion, Training Laboratories, Conflict Resolution

PROBLEM

The needs of law enforcement education are not met by traditional classroom instruction. Outdated, irrelevant textbooks and courses teach only rules, codes, statutes and regulations, while ignoring the fact that on the job a police officer is expected to cope with a wide variety of intricate and sensitive human situations.

The Portland Community College Public Safety Department needed an instructional strategy which stressed the human problems of how and when to enforce the law.

INNOVATIVE APPROACH

The "Simulated Law Enforcement Experience" (SLEE) developed by Portland Community College provided a laboratory setting in which students could engage in real life situations. It was felt that by actually performing necessary actions, students would understand behavior and learn to act appropriately.

The laboratory was constructed for maximum realism in the re-creation of particular situations. Convincing settings (kitchens, alleys, taverns, grocery stores) were designed. Planners employed a closed stage, eliminating the possible distraction of a visible audience. Veteran police officers and actors portrayed people in the encounters. Student policemen were even harassed in these simulated encounters.

Unobtrusive cameras videotaped each situation, and instructors an other students sat behind darkened windows evaluating the situation without distracting the performance.

Design consultants provided blueprints for the laboratory which was constructed in two months. (This included the building of stage settings.) Project technicians developed a basic system for videotaping which could be easily modified for changing demands, and the project director, using instructors' suggestions, wrote work scripts providing direction and a working outline for laboratory episodes.

The laboratory became operable in October, 1970, and groups of students began to participate in laboratory situations, usually in teams of two, consonant with the common practice of large city police officers.

After a team of students had run through its episode, the students watched a videotaped playback in the viewing room and listened to a critique by an officer coach and other students. The team then remained in the viewing room to watch the other students' episodes until all teams were finished. Episodes varied between five and twenty minutes in length, with an average of about eight minutes.

Sixteen criteria were developed to evaluate student performance. The first group of criteria tested the student's procedural knowledge: the second, his attitude and ability to deal with people.

In its first year, the program served nearly 1,500 students, and in its second year, though not using ECC funds, it served 1,800. The laboratory's episodes were revised somewhat, and its operation was made more sophisticated. It continues as an ongoing feature of Portland Community College and has been made available to several outside agencies, including the Metropolitan Police Academy, the Portland Civil Service Board, and the Portland Model Cities Program.

COST

The $23,488 grant from the Educational Coordinating Council represented approximately one-third of the total investment in the SLEE project. Portland Community College provided about a third in space and facilities, and the remainder came through donations of time, material, and equipment from individuals supporting the project's objectives.

Approximately 72 percent of the Educational Coordinating Council's grant was spent on development costs. The largest single expense (about $6,000) was for materials and equipment, mostly for the construction of the laboratory. About $5,000 went to the technician and the two design consultants. The rest (about $4,500) paid for the project director's release time and for his secretary.

The operational costs went for the continued work of the project director and his secretary ($4,500), for aides to operate the lab's equipment ($2,000), and for evaluators' fees. The evaluators were outside experts brought in to provide a consistent evaluation of the SLEE episodes.

Expenses of setting up this program are mainly cost of constructing the laboratory and of purchasing videotape equipment. PCC purchased three cameras and had a compatible television board designed which would guard against equipment duplicating, caused by the incompatibility of some commercial lines.

A further expense might be payment of persons needed to act the various roles in simulated episodes. This expense could be avoided if as at PCC, the actors were volunteers.

EVALUATION/APPLICABILITY

Data collected from the evaluation sheets of two separate groups showed significant improvement, between their first and fifth sessions, of 24 percent average increase in effectiveness.

Besides improving student performance, the laboratory changed the relationship between students and working police officers. Students could not maintain their stereotypes of older generation police officers after working with them toward a better understanding of crisis situations. Police officers showed their commitment by volunteering their own time for role playing in the laboratory.

Although the laboratory has not been in operation long enough to allow a thorough follow-up study of on-the-job performance, approval of the project was indicated by a sample of 123 students. Seventy-six percent found the episodes "very realistic," and 94 percent considered the laboratory "very effective in reinforcing classroom training." Professionals in many disciplines observed the laboratory in action and expressed their enthusiasm and support. ABC-TV has filmed material about SLEE for a documentary special.

The simulation laboratory approach would be an effective training device for any occupation which involves much direct interaction with people, such as social work, counseling, training, and business.

A school wishing to duplicate the physical layout of the laboratory would be able to contact Portland Community College and arrange for technical consultation. Police training schools could utilize the course outline developed by Portland Community College, as well as samples of its SLEE episode outlines and its evaluation techniques.

COMPUTER BUSINESS SIMULATION

Clifford F. Gray
School of Business and Technology
Oregon State University
Corvallis, Oregon 97331

Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
		Community College
	X O	Four-Year Institution
Level		4th year
		3rd year
		2nd year
		1st year
Area		Science
		Social science
		Humanities
		Education
		Technical/career
	X O	Business Administration
Problem		Conceptual difficulty
		Diverse backgrounds
		Inflexible scheduling
		Need for personalization
		Issues ignored
	X	Lecture method inhibits learning
		Lack of relevance
		Loss of interest
	X	Realistic experience needed
		Alternative course structure needed
		Demand for theory-method consistency
		Other
Innovative Approach		Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
		Media/multisensory reinforcement
		Onsite/field study
		Problem centered
		Process centered
	X	Simulation
		Tutorial/independent study
	X	Computer
		Programmed instruction
		Large group/small group alternation
		Other

ERIC Descriptors

Autoinstructional Aids, Computer Assisted Instruction, Problem Solving, Models, Business Education, Management, Management Games, Simulation, Individual Instruction

PROBLEM

The purpose of the project known as Computer Business Simulation was to present the student with a learner-center environment in which he could deal with complex business problems that could not be solved by manual methods and which were not well suited to the lecture method of instruction. A pedagogical device was needed which would interact with the student, allow him to experiment and to move at his own pace, give immediate feedback, and provide the opportunity to solve real world problems.

INNOVATIVE APPROACH

A computer exponential smoothing forecasting simulator was developed[1] along with a monograph explaining the theoretical basis for the model.[2] The simulator was designed to satisfy these needs:

1. To improve the student's understanding of exponential smoothing,
2. To present the student with complex problems similar to those found in business.

The project objectives were:

1. To develop an exponential smoothing model for teaching and solving real management forecasting problems,

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[1]Clifford F. Gray, "An Exponential Smoothing Forecast Simulator: A Computer Manual." Salem, Oregon: Educational Coordinating Council, 1971.

[2]Gray, "A Vignette on Exponential Smoothing Forecasting--To Accompany the Exponential Smoothing Forecast Simulator." Salem, Oregon: Educational Coordinating Council, 1971.

2. To publish that model and a computer manual of operation of the model for use in the basic core production management course.

3. To test the model and the manual for their effectiveness as learner-centered, self-pacing instructional devices.

The model developed allows the student to handle large quantities of data found in forecasting problems. The model was placed in the computer storage in the higher education computer network.

The model, monograph, and manual were used in the one-term course in basic core production management at Oregon State University. The class was offered twice, in Winter and Spring terms. During the Winter term there were two classes serving as control groups, with one experimental section, and Spring term there were one control and one experimental group. The difference between the two groups was that the experimental group performed the three-day supplemental computer exercise, which was the actual use of the computer simulator.

COST

The following table sums up the approximate budget:

Principal Investigator 1.0 FTE for 3 months	$5,062
Graduate Assistance .15 FTE for 3 months	900
Clerical	100
Employee Benefits (9%)	546
Communications	60
Travel	250
Duplicating	40
Computer	500
Total Direct Costs	$7,458

Application of this simulator is inexpensive and simple to use in the same course or subject matter. There are no costs for extra staff, only student purchase costs for text and manual, and approximately .33¢ per simulation for computer time.

EVALUATION/APPLICABILITY

No data are available on the instructional effectiveness of the model, manual, or monograph. The project evaluated only the computer supplementary exercise; i.e., the performance by the student employing the computer simulation. Data collected and analyzed for the project were limited to a comparison of the understanding which the control and experimental groups gained of the forecasting concepts; a comparison of their attitudes toward the

computer supplementary exercise: and a comparison of their attitudes toward the value of the computer.

Results were mixed. The experimental groups approximately equaled the control groups in understanding, judged the computer simulation to be more "pleasant, valuable and dynamic," and judged the value of the computer in teaching to be greater in bringing realistic problems to the classroom, than did the control groups.[1] The groups were substantially similar in their perception of the value of the computer in helping to understand concepts.

Computer enriched instruction in business administration appears to have two major advantages: 1) it allows more realistic problems to be brought to the classroom, and 2) it provides a favorable learning atmosphere.

Potential expansion of a computer-augmented approach to learner-centered and problem-centered instruction is promising and should be investigated. Development of the simulation approach to applied theory may yield an excellent tool in the social sciences, physical sciences, and natural sciences. Models would need to be developed for computer simulation.

The simulator is applicable to the same course or subject matter in any situation providing the computer is readily available to students.

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[1]Gray, "Expressed Student Attitude Toward Conventional Versus Computer Supplemented Instruction," to be published in Decision Sciences in 1973.

5. ONSITE/FIELD STUDY

Methods in Reading (51) p. 111

Junior High Teacher Preparation Model (52) p. 119

Related Projects:

Autotutorial Biology (71) p. 151

Integrated Geography (85) p. 229

Project Oregon's Future (94) p. 259

METHODS IN READING

Ed 350
Methods in Reading--
Elementary

Gwyneth E. Britton
Reading Clinic, School of Education
Oregon State University
Corvallis, Oregon 97331

Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
		Community College
	X O	Four-Year Institution
Level		4th year
		3rd year
		2nd year
		1st year
Area		Science
		Social science
		Humanities
	X O	Education
		Technical/career
		Business Administration
Problem		Conceptual difficulty
		Diverse backgrounds
	X	Inflexible scheduling
		Need for personalization
		Issues ignored
		Lecture method inhibits learning
		Lack of relevance
		Loss of interest
	X	Realistic experience needed
		Alternative course structure needed
	X	Demand for theory-method consistency
		Other
Innovative Approach		Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
		Media/multisensory reinforcement
	X	Onsite/field study
		Problem centered
		Process centered
		Simulation
		Tutorial/independent study
		Computer
		Programmed instruction
	X	Large group/small group alternation
		Other

ERIC Descriptors

Reading, Developmental Reading, Reading Instruction, Lecture, Practicums, Field Studies, Large Group Discussion, Teacher Education, Teacher Interns

PROBLEM

A number of national and local studies and inquiries of teachers have pointed to the inadequacy of preparation of teachers to teach reading. Specific areas identified as needing improvement are:

1. Too little time spent in learning how to teach reading,
2. Practically no preparation in intermediate grade study skills,
3. Little preparation in recognition, diagnosis, or treatment of reading difficulties,
4. Little guidance in reading research,
5. Little experience in integrating reading with practice (practical application),
6. Little relevance of preservice reading courses to real classroom situations.

In reponse to these concerns, the Oregon State University Reading Clinic piloted a Methods in Reading course. This course provided a lecture/discussion situation and supervised onsite experience for ninety students per term for one term. The clinic found that the student instructors "acquired a personal confidence in their ability to communicate reading skills to a youngster and had attained a teaching competency of reading skills..."

The reading professor wanted to expand this pilot project to include all elementary education majors. The present project attempts that expansion.

The focus of concern was the incorporation of large group instruction into the existing elementary reading methods course. In order to provide experience in onsite reading methods for all elementary education students, a

strategy was needed which would include the many students in the elementary education program.

Needs to be met included:

- scheduling which would be appropriate for university students, for the site, and for the elementary students,
- coordination of large group (90 students) lecture/discussions, individualized instruction for OSU students, and onsite practicum sessions.

The pilot project sought to provide practicum experience in teaching reading, including word recognition, and diagnosis and treatment of nonremedial elementary students at all grade levels. This approach was designed to provide the college student with skills in the teaching of reading and with confidence in those skills.

Expansion of the project sought to coordinate programing and scheduling for large numbers of students without reducing the level of gain achieved by students in the pilot project. The goal was to expand the successful small group pilot project for the individualized/onsite program to include all elementary education majors.

INNOVATIVE APPROACH

The approach taken was a closely scheduled and coordinated program featuring both large group lecture/discussion and onsite practicum. Individualized instruction would be available to college students on a scheduled basis where they could consult with the onsite reading supervisor regarding their youngster's reading program.

Stated objectives of the expanded innovative reading methods course were:

1. To provide a large-group/individualized/onsite instructional strategy as a more efficient procedure to utilize in teaching undergraduate students elementary methods in reading,
2. To evaluate the efficacy of this large-group/individualized/onsite teaching procedure as a means of preparing elementary reading instructors,
3. To provide a reading program at the undergraduate level for the improvement of teaching developmental reading in Oregon elementary schools,
4. To provide student-instructors with an opportunity to profit from a supervised reading practicum experience by extending their knowledge as to the nature of a youngster's actual reading needs, diagnosing a student's reading performance, planning a reading lesson in terms of needs, teaching a directed reading lesson, and then evaluating the student's performance,
5. To provide the elementary learner with specific instruction in those reading skill areas which are impeding his advancement and contributing to a slower rate of progress,
6. To provide the onsite elementary school faculty with an acquaintanceship of new and varied types of reading materials which will be utilized in the program provided by the Oregon State University School of Education.

Students attended a daily one-hour reading methods lecture Monday through Friday for the initial three weeks of the term. The lecture/discussion sessions, conducted by the major reading professor, provided students with fifteen hours of reading methods instruction prior to their planned onsite teaching experience with students.

Beginning in the fourth week of the term, student-instructors were bused to and from an onsite elementary school location each Tuesday and Thursday for a seven-week period of teaching reading skills in supervised situations, to elementary school children. Each school site used a thirty-member team of student instructors and one reading professor.

Large group lecture/discussion was put on a three-day a week schedule during the seven weeks of onsite practicum. Lecture topics were related to onsite experience. Specific teaching problems were dealt with in private consultation with the reading supervisor, who made himself available for this purpose.

Occasional round table discussions (thirty OSU students in each) were held to share teaching experiences, exchange reading methods and devices, and explore special learning problems of elementary children.

COST

A budget of $7,350 was approved for this project. Of this amount $2,400 was paid for one half-time secretary from March, 1970, to June, 1971, at $160 a month.

The project's major costs covered services and supplies. Necessary instructional materials were purchased for $2,500, while Oregon State

University instructors busing fee was partially paid for with $1,650. In addition, three bookcases were bought at $100 each. Duplicating and reproduction, communication and travel for the professor to onsite locations accounted for the remaining $500.

EVALUATION/APPLICABILITY

This project is replicable only in the education department. The course was excellently designed and implemented with respect to maximizing the benefits of both structured and unstructured experiences. The course and procedures are very beneficial for revitalizing the educational experience of teaching students. Also, for the department interested in student-centered courses, this course could serve well as an intermediate experience to help the student who is used to highly structured courses to adapt to loosely structured experiences.

Evaluation devices and reporting are very clear about the increased confidence these students achieve in their ability to apply reading methodology appropriately, as well as their subjective feeling that they have learned more.

The project was detailed in its description of process and methodical in its course design. Student response was extremely favorable. Some students expressed strong appreciation for the practicum and lesson plan experience, citing the significance which the course had in reinteresting them in their future career. Personal contact with children and actual use of methodology were indicated as influential in their rating of the course.

Duplication of the project in the same subject area would require one-half time clerical assistance for ordering and monitoring instructional

materials for children. Graduate and some undergraduate students assist in this project, receiving college credit for this experience as an integral segment of their Master's in Reading program. Depending on site locations and preferred arrangements, bus travel for student-instructors to and from sites may be needed.

JUNIOR HIGH TEACHER PREPARATION MODEL

Ed 310, 312, 430, 431
Participating curricular courses

Ed 402, 405, 407, 408, 416
Intensive Studies and practica

Carvel Wood
School of Education
Oregon State University
Corvallis, Oregon 97331

Applicability		✗ Describes this project O Potential use of this approach
Institution		High School Community College
	X O	Four-Year Institution
Level	X O	4th year
		3rd year 2nd year 1st year
Area		Science Social science Humanities
	X O	Education
		Technical/career Business Administration
Problem		Conceptual difficulty Diverse backgrounds Inflexible scheduling
	X	Need for personalization
		Issues ignored Lecture method inhibits learning Lack of relevance Loss of interest
	X	Realistic experience needed
		Alternative course structure needed Demand for theory-method consistency
	X	Other (Need for special program for junior high teachers)
Innovative Approach		Integrated curriculum/learning package Interdisciplinary/interinstitutional Media/multisensory reinforcement
	X	Onsite/field study
		Problem centered Process centered Simulation Tutorial/independent study Computer Programmed instruction Large group/small group alternation
	X	Other (Sequence of practicum experiences)

ERIC Descriptors

Junior High Schools, Secondary School Teachers, Teacher Education, Student Teaching, Cooperating Teachers, Tutoring, Teacher Interns, Field Studies, Work Experience Programs, Models

PROBLEM

The School of Education at Oregon State University perceived a need for a new general model for teacher education which would provide a special program for teachers of junior high school students. In addition, the faculty sought to implement the following goals as part of the program: improvement of instruction in the schools and in the university; creation of a climate conducive to change for students, teacher trainees, teachers, administrators and parents; provision of an individualized, realistic and sequenced set of experiences for university teacher trainees; and provision of personalized instruction in the schools.

To implement these changes, developers planned a field-centered education program whose long-term goal was the formation of an educational complex. The focus of the field-centered education program was the gradual acquisition of needed experiences in the schools by teacher trainees prior to student teaching.

It was felt that these innovations, in addition to providing benefits now, would be of significant value later for certain anticipated changes in the structure of the educational system, especially the implementation of the idea of the "Middle School," which the climate of change mentioned above would actually help bring about.

INNOVATIVE APPROACH

This model developed a sequence of personalized educational experiences for teacher trainees prior to student teaching. The sequence consisted of four training stages or levels designed to prepare the trainee for the next step of

experience. Student entrance was at the tutorial level, which was the first of three quarter-long experiences. Successful tutors became student assistants, and then teacher associates. Finally, there was the possibility of a one-year resident (intern) experience depending upon openings available at the school.

Various course offerings in education were utilized for multiple entry into the project, so that the student could enter the program via normal School of Education courses. The program thus augmented many of several regularly offered courses.

In order to carry out the project, close cooperation was required between the School of Education and the Corvallis Public School District. Oregon State University provided representatives of the elementary and secondary divisions of their education program, a field project director who worked with public school teachers involved in the project, and a clinical professor who worked directly with students in the classroom, helping them individualize programs and providing supervisory assistance when required. These persons worked together to plan and revise the teacher education model, and to oversee its implementation.

The Corvallis Public School District's Western View Junior High School supplied students, physical classroom space, equipment, and facilities. Cooperating teachers of this school also assisted in functional ongoing planning of the project.

Students from the School of Education participated at four training stages. The trainee entered as a tutor who worked on a one-to-one basis

with students needing additional help. This tutoring took place both in and out of the classroom, and the tutor gained familiarity with the needs of the students, as well as with ways these needs could be met. In addition, the tutor got to know various students and gained a first-hand acquaintance with basic functioning of the classroom and with materials used in instruction.

The second stage, that of Teacher Assistant, saw the teacher trainee preparing units with supervision from his cooperating teacher and teaching them to small groups of students. The Teacher Assistant also led group discussion on pertinent topics.

As Teacher Associate--the next stage--the student performed duties comparable to those of the student teacher in most undergraduate programs, but because of his previous experience as a tutor and assistant, the associate rarely needed the observation period usually involved in student teaching. He dealt with the class as a whole and, upon successful completion of this phase, was eligible for graduation from the teacher training program.

The final stage, internship, involved a postgraduate student working in his own classroom at .67 FTE, and receiving onsite supervision from instructors in the various seminars in which the intern was enrolled. There was comparative difficulty in instituting this aspect of the model, since the availability of vacancies and funds often forbade the hiring of interns. Nevertheless, the stage of internship remains part of the overall model for development of teachers.

In the operation of the program, student movement through the four stages was fluid. It was dependent upon the student's successful handling of tasks

and upon his readiness for the next step, rather than upon his being "officially" at a specific level.

COST

In order to adopt this model, funding would have to be available at the rate of about $7,630 per year. If 65 students participate, as in the present program, the cost is just over $115 per student.

In addition, a local school district must be able to release one or two faculty members for two periods a day. For this, the district can expect to receive approximately 5,200 hours of tutorial help (tutors receive no reimbursement) and 2,300 hours of supervised help to students and teachers. In addition, if the program is like the model described, there will be nine full-time teacher associates working in the school for all of Spring term. The total hours and amount of service rendered are substantial.

EVALUATION/APPLICABILITY

Two evaluative doctoral dissertations and a progress report are available on this project.

Difficulties were encountered in the area of scheduling. In addition, there were some difficulties in the area of human problems, such as fear of change, possible replacement of the individual as teacher, and the syndrome of "invasion" of a teacher's classroom by outside interests.

The program increased its level of operation after the first year, presently (in 1973) involving 22 local teachers and 72 university trainees.

included are three junior-year student teachers serving one year internships--a new pattern which is working well.

After the development and test period, there are no extra costs to the university. Staff can be reassigned to the new program design and participating schools can release faculty time to assist with placement, coordination, and evaluation. University students actively seek participation, and incentive pay is not necessary.

The model developed here would be applicable to any college or university school of education seeking a program for the training of junior high teachers and, with minor adaptations, would be applicable for the training of teachers at any level. The success of the model is dependent upon the extent to which a local school district is willing to cooperate.

Once this type of cooperative program has been established and accepted, resources of the cooperating institutions can be reallocated to support the new priorities.

6. INTERDISCIPLINARY/INTERINSTITUTIONAL

Industrial Engineering and Data Processing Technology (61) p. 129

Interdisciplinary Ecology (62) p. 137

Related Projects:

Methods in Reading (51) p. 111

Individualized Curriculum for Electronics (81) p. 193

Project Oregon's Future (94) p. 259

Developmental Writing (83) p. 209

INDUSTRIAL ENGINEERING AND DATA PROCESSING TECHNOLOGY

IE 497, 498
Industrial Engineering Analysis and Design

6900 series
Operations Research (discontinued)

Michael S. Inoue
Department of Industrial and General Engineering
Oregon State University
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and
Conrad Cook
Department of Data Processing Technology
Chemeketa Community College
Salem, Oregon 97303

Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	X O	Community College
	X O	Four-Year Institution
Level	X O	4th year
	X O	3rd year
	X O	2nd year
		1st year
Area	X O	Science
	O	Social science
		Humanities
		Education
	X O	Technical/career
	O	Business Administration
Problem		Conceptual difficulty
		Diverse backgrounds
		Inflexible scheduling
		Need for personalization
		Issues ignored
		Lecture method inhibits learning
		Lack of relevance
		Loss of interest
	X	Realistic experience needed
		Alternative course structure needed
		Demand for theory-method consistency
	X	Other (Need for interdisciplinary communication)
Innovative Approach		Integrated curriculum/learning package
	X	Interdisciplinary/interinstitutional
		Media/multisensory reinforcement
		Onsite/field study
		Problem centered
	X	Process centered
	X	Simulation
		Tutorial/independent study
	X	Computer
		Programmed instruction
		Large group/small group alternation
		Other

ERIC Descriptors

Community College, Interinstitutional Cooperation, Engineering, Technology, Simulation, Student Projects, Student Research, Field Studies, Interdisciplinary Approach

PROBLEM

The communication problem between computer personnel who are business oriented and industrial engineers who are more scientifically oriented hinders cooperation between the two groups.

This problem is observable at the college level. Technology programs at community colleges are not complemented by professional programs at four-year universities. The case of nursing is an exception, but in most programs students must wait until actual job experience in order to learn to communicate with the people with whom they will be working. This is a deterrent to the success of many industrial projects.

Specialization of educational background often leads to communication difficulties. The traditional classroom situation contributes to this deficiency since it emphasizes specialization without improving interdisciplinary communications skills. This is an especially critical problem for engineers and technicians who must work together in real life.

INNOVATIVE APPROACH

To meet this need, it was proposed at Oregon State University to develop and implement an alternative learning technique to traditional classroom teaching by providing a realistic simulation of industrial environment requiring active student involvement and interdisciplinary communication for solving systems problems arising from actual business operation.[1]

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[1](Project Proposal, p. 2)

Students from both fields cooperated with each other in the formulation of solutions to problems. Engineering students from Oregon State University used their knowledge of engineering design to select simulation models to be used in projects and the data collection procedures to be adopted. Technology students contributed their knowledge of hardware operations and software programing.

The program was planned to stress the learning of "adaptability" rather than specific skills and disciplines. Thus students were forced not to take an established casebook approach but rather to develop their own methodology for investigating problems.

A data communication link between the participating schools was established as the major communication link and data storage center for continuous updating of information and instructions.

Teams were formed consisting of two or three students from each school, and the teams operated as task forces. Instructors formulated a detailed framework under which student teams operated with autonomy. Computer time, budgeted to each team, was used later as a basis for cost-effectiveness analysis.

Each group selected a project theme from a pool identified as likely to compel each student to make maximum use of individual knowledge and background. The problems were typical of problems encountered by engineers and technicians working together in real life situations.

Each team was responsible for:

1. Selecting and studying a data-processing operation at Chemeketa Community College Computer Center,
2. Planning and scheduling the inter-institutional communication for the team,
3. Constructing a display board depicting research objectives,
4. Submitting individual project reports,
5. Collecting data from industries and formulating case studies,
6. Implementing proposed systems whenever possible.

COST

Twenty-four students took part in the initial program. Thus the cost per student, with a budget of $10,996, was about $450. The benefits of the program were great, both in terms of experience gained by students and in terms of the value of the work they produced. Project directors estimated a $356,000 return to society from the materials formulated by the students. A total of $2,011 was spent on equipment: two data communication terminals and an acoustic coupler for data-phone communication. This equipment will be used to serve present and future data-processing needs.

EVALUATION/APPLICABILITY

Some of the more outstanding results of the program were numerous case studies and exercise problems formulated by students for future instructional use, memo-motion film recordings, computer programs for statistical data-processing and simulation, and a number of awards and

publications. Employment opportunities have resulted in the form of a work-study agreement with the state of Oregon, and permanent positions have been offered to graduating students. Ties now exist between Chemeketa Community College and Oregon State University which did not exist before, and links have been established between Linn-Benton Community College and Oregon State University.

General satisfaction with this project was expressed by project directors. The success of student engineer-programmer team projects indicates successful achievement of the project goal: better communication in a job situation.

Project directors found extensive applicability. First, the project has value as a stimulus and source of information to other interinstitutional projects where complementary disciplines may be brought together. Second, case studies submitted by students were expected to add "real life flavor" to such courses as EDP Systems, Operations Research, Data Processing and Industrial Engineering Statistics, Quality and Reliability Control, and Engineering Systems Analysis and Design.

This project also served as a case study for a feasibility analysis of a long-range interinstitutional program in the state of Oregon, and elsewhere, for National Science Foundation funding.

The duplication of a comparable program, such as this, between a university and a community college or, similarly, between engineering and data-processing departments of the same university, would depend in large measure on whether students had access to a computer center comparable to the one at Chemeketa Community College, and to a system comparable to

Oregon State University's CDC 3300 time-sharing system. Adjustments might be needed to accommodate existing equipment, or additional equipment might be needed.

INTERDISCIPLINARY ECOLOGY

GST 199
Environmental Awareness and Action

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Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	O	Community College
	X O	Four-Year Institution
Level		4th year
		3rd year
	X O	2nd year
	X O	1st year
Area	O	Science
	O	Social science
	X O	Humanities
		Education
		Technical/career
	O	Business Administration
Problem	X	Conceptual difficulty
		Diverse backgrounds
		Inflexible scheduling
		Need for personalization
	X	Issues ignored
		Lecture method inhibits learning
	X	Lack of relevance
		Loss of interest
		Realistic experience needed.
	X	Alternative course structure needed
		Demand for theory-method consistency
		Other
Innovative Approach		Integrated curriculum/learning package
	X	Interdisciplinary/interinstitutional
		Media/multisensory reinforcement
		Onsite/field study
	X	Problem centered
	X	Process centered
	X	Simulation
		Tutorial/independent study
		Computer
		Programmed instruction
		Large group/small group alternation
	X	Other **(Group problem-solving projects)**

ERIC Descriptors

Philosophy, Interdisciplinary Approach, Simulation, Environment, Ecology, Environmental Education, Environmental Research, Social Responsibility, Films, Field Trips, Citizen Participation, Student-Teacher Relationship, Student Participation, Student Research, Student Projects, Grading

PROBLEM

The dearth of courses dealing with environmental problems explained by the complexity of the task of giving students an intelligent grasp of those problems and the intellectual tools to deal with them.

Environmental problems are complex, partly because they are still new and ill defined, but mostly because of their vastness. An adequate understanding of environmental issues must be broadly interdisciplinary, drawing on expertise in fields of natural and social sciences and the humanities. Such an approach in turn requires a substantial restructuring of the course in environmental education.

INNOVATIVE APPROACH

The project director, a member of the Portland State University Philosophy Department, developed a new and innovative course entitled "Environmental Awareness and Action," which attempted to present the interrelatedness of ecological concerns and solutions, and to stress value and attitude change as one of the central tasks of environmental education.

Four of five course objectives spoke to the cultivation and development of different kinds of awareness, perspective, and appreciation. Some of the instructional innovations used to meet the objectives are on the following pages:

Objectives	Approach
1. Convey information about current environmental problems and the range of solutions available to our society.	1. All approaches below are geared to this general objective.
2. Develop a sense of the complex interdependence of all life processes on the planet.	2a. Graphic display of ecological concepts. 2b. Supplementing technical literature on ecology with literary writings of naturalists who express their feel for the interrelatedness in nature.
3. Develop an awareness and an appreciation of the whole range of values at stake in our growing concerns about man's impact about the natural world.	3. Awareness of the range of different values involved in environmental concern was developed by showing nature films which present values concretely and vividly, and then asking students to identify and describe the values encountered. Field trips were a similar device, as was concrete, local conservation controversy.
4. Promote an awareness of those attitudes and values of our culture which hinder us as a society from dealing effectively with environmental problems.	4. Guided discussion was used to promote consideration of values and attitudes which impede or support effective conservation action.

Objectives (continued)

5. Provide opportunity and stimulus for an imaginative consideration of alternative attitudes and values which are more supportive of sound and wholesome environmental policies.

Approach (continued)

5. One technique involved a role-playing approach, wherein the student was asked to explain to an imaginary being from another planet why we have our present environmental difficulties. The obverse was then employed: the student assumed the role of the imaginary being and gave advice to earthmen on solutions. This exercise enabled the student to become aware of his own cultural attitudes, freeing him to view alternatives. The study of life styles and perspectives of a variety of cultures also encouraged mental freedom from culture-bound perspectives, increasing the scope of envisioned alternatives.

New modes of instruction complemented new ways of relating subject matter as the major kinds of innovation for this course. Another innovation was to schedule the course as a two term, ten-hour (total) course, rather than the conventional three term, nine-hour course.

The following additional innovative instructional approaches were also cited by project developers:

1. Course design promoted ecological literacy and informed citizenship, rather than specialization;
2. Range and interrelatedness of the course were designed to be consistent with the range and interrelatedness of environmental problem solving;
3. Student cooperative education represented an interaction approach;
4. An "ethos" of mutual education was established and value and attitude change actuated in the course;
5. Faculty served as fellow learners--redefinition of instructional method--faculty as facilitators rather than as authorities;
6. Students served as instructors--equal--redefinition of authority to derive not from ascribed authority but from specific expertise;
7. Interrelatedness of class members (students and faculty) simulated interrelatedness of environment.

Planning and development of the course occurred during the academic year 1970-71 and resulted in a comprehensive course description and plan. A university instructor on one-third FTE was used in this effort.

A list of readings and other informational resources (including films, community people, etc.) was developed using a number of faculty members expert in different areas, as consultants. Instructional techniques and classroom procedures were formulated in consultation with these experts. Expertise was from these areas: Biology, Economics, English, Earth Sciences, General Science, Educational Psychology; two students who specialized in an interdisciplinary approach to environmental problems were also used as consultants.

Planning and development took six months (two terms). During Winter term (month 1-3) a series of meetings among the director, faculty consultants, and student consultants was held to develop the basic course outline and the course objectives. Concrete proposals were prepared in writing for consideration and modification by the committee. The ability of this inter-disciplinary and student-faculty committee to work on a task as a team was also developed.

During Spring term (months 4-6) a specific program for the course, including organization of topics, description of instructional techniques, and methods of grading were developed as a team effort. The project director worked with individual faculty members in developing lists of readings and other instructional effectiveness of the course. Summer term was spent in final planning by the project director.

The two-term sequence course, titled Environmental Awareness and Action, offered five credit hours per term and met twice a week. It was organized as follows:

First term: A series of informational programs (speakers, films, discussions, readings) on the following topics: population, pollution, earth resources, elementary ecology, wilderness and wildlife, urban stress, environmental economics, attitudes and values and avenues for legal and political action in solving environmental problems. Areas were selected which could not be ignored by anyone wanting to be environmentally aware and effective.

Second term: Students worked on projects relating to solution of some environmental problem. Most of these were group projects. Encouragement was given to projects having potential influence on public policy and life styles. Students were encouraged to go to local elementary and secondary schools to present informative programs on their research. In addition, the class met weekly for a series of programs of general interest. These were often a followup on topics dealt with during the first term. At midterm, students presented progress reports on their projects to the class. The last several weeks were devoted to presentation and discussion of projects.

No fixed pattern was imposed on projects, except that action alone was not acceptable (e.g., picking up solid waste in one's neighborhood and

getting it to a recycler). Projects were encouraged which 1) required the student to inform himself about some area, 2) might lead to results which would guide individual conduct and/or public policy, or which could be used as instruments in changing public policy, and 3) would be shared--at least with other members of the class.

An item of particular interest in many innovative efforts is that of student incentive. Traditionally, this factor has been addressed by assignments and by grading. Innovations which seek to tap student interest, conceptualization, and self-directed task performance are often threatened by a loss in student productivity, particularly in written, content-based productivity. Opportunity for creativity is limited, and the ambiguity of the reports is heightened when the assignments are vague or in unfamiliar areas.

This project sought to minimize this threat. Thorough planning as to clear objectives and procedures was done to reduce potential ambiguity. Students understood clearly what was expected and how to accomplish it. Several deadlines were imposed, such as time for selection of project, progress report at end of first term, and final reports at end of second term. This device served to sustain effort.

Interest and motivation were also sustained by promoting a sense of interdependence, mutual responsibility, and community among class members. The weekly meetings of the class during second term, when most students were otherwise working in small groups, helped achieve this sense of community.

It is significant to review ways of dealing with these problems, since innovations often fail or reduce their effectiveness because of lack of attention and planning in such matters.

COST

A grant of $6,646 was used almost entirely for salaries and wages of project directors. A sum of $1,050 was budgeted for consultants, in this case faculty from other departments who assured the interdisciplinary quality of the course.

These sorts of costs are of necessity ongoing. As PSU gave every evidence of desire to continue the course, funds will need to be made available, perhaps in the form of released time, to provide an adequate representation of disciplines.

EVALUATION/APPLICABILITY

Two means of measuring and objectively evaluating the project in terms of instructional effectiveness were used:

1. Comparison of the course with standard departmental science courses in terms of their success in leading the student to assimilate information and understand basic scientific concepts,
2. Comparison of the course with single discipline environment courses offered at Portland State University. Students and faculty who have experienced both approaches (this multidisciplinary approach and the conventional, single-disciplinary approach) were resources for the comparison.

Two considerations stand out in this project as being realistic concerns addressed in the development of an innovative course:

1. Thorough planning, conducted in an organized, structured, and conceptually clear manner,
2. The clarity with which learning needs and processes were identified and treated.

Duplication of this project would require obtaining from the project director a complete discussion of the rationale for the approach, course syllabus, readings, and pertinent arrangements. A particularly important arrangement was frequent conferences with participating faculty from other disciplines, to ensure commitment to the goals and procedures of the course.

7. MEDIA/MULTISENSORY REINFORCEMENT

Autotutorial Biology (71) p. 151

Multimedia Program for Voice Instruction (72) p. 161

Multimedia Architectural Graphics (73) p. 169

Visual Arts (74) p. 177

Projection Tutorial in Biology (75) p. 183

Related Projects:

Elementary Philosophy (11) p. 11

Autotutorial Organic Chemistry (21) p. 21

Continuous Program for Physical Science (31) p. 49

AUTOTUTORIAL BIOLOGY

Bi 101, 102, 103
General Biology

Robert Ross
Department of Biology
Linn-Benton Community College
Albany, Oregon 97321

Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	X O	Community College
	O	Four-Year Institution
Level		4th year
		3rd year
	O	2nd year
	X O	1st year
Area		Science
		Social science
		Humanities
		Education
		Technical/career
		Business Administration
Problem		Conceptual difficulty
	X	Diverse backgrounds
	X	Inflexible scheduling
	X	Need for personalization
		Issues ignored
		Lecture method inhibits learning
		Lack of relevance
		Loss of interest
		Realistic experience needed
		Alternative course structure needed
		Demand for theory-method consistency
		Other
Innovative Approach		Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
	X	Media/multisensory reinforcement
		Onsite/field study
		Problem centered
		Process centered
		Simulation
		Tutorial/independent study
		Computer
		Programmed instruction
		Large group/small group alternation
		Other

ERIC Descriptors

Community Colleges, Biology, Autoinstructional Aids, Tape Recordings, Laboratories, Science Laboratories, Flexible Schedules, Motivation Techniques, Laboratory Manuals, Programed Materials, Slides, Sequential Approach, Field Studies, Student Research, Student Participation, Group Instruction

PROBLEM

When students were asked for their suggestions on ways to improve the general biology program at Linn-Benton Community College, their responses expressed concern not with the curriculum, or with the instructor's style, but with scheduling. Linn-Benton Community College students travel long distances, have a variety of home and job commitments, and come from diverse educational and experiential backgrounds. The traditional four-day-a-week schedule was difficult for students who lived far away or who had jobs to manage. Limited laboratory hours were problematic for students with little previous academic experience or with jobs. Diversity of background produced a student population who used diverse learning processes. Their need was for individualized learning methods, pacing, and scheduling.

INNOVATIVE APPROACH

The Autotutorial Biology Program at Linn-Benton Community College was designed to resolve these problems and to treat a problem generated by the looser structure of the new program.

Materials were developed which could be used by the student on his own schedule and which offered several methods of learning the same material. Students could select their own method of instruction from several available methods, could arrange their own instructional and laboratory hours, and could repeat or reduce their exposure to instruction or laboratory according to their individual needs.

Autoinstruction in the biology program provided flexibility in student learning pace and schedules. Through recorded materials and open laboratory

hours, students could overcome restrictions of time and limited teaching staff; they progressed at their own rates. This reliance on self-instruction implies that students must be self-motivated if they are to learn in this approach. Thus, encouragement of motivation became a focus of attention. A problem-centered approach was chosen to stimulate the student and give him direction.

Arrangement of course materials around biological problem areas was planned to increase course relevance and reduce the confusion experienced by some students when structure is loose. The project director developed self-teaching course manuals which included nonlaboratory exercises and materials. Taped lectures, lecture scripts and teaching slides were prepared, programed with the manuals and made available to students at the Learning Resource Center of the college.

In addition to the project director's work, the development phase required the following personnel over a period of one to one and one-quarter years:

Instructor	Full time
Laboratory preparator (prepares equipment for experiments)	Full time
Two laboratory instructors	Each part-time for 35 hr. week total
Photographer (for teaching slides)	30 hr. week for 7 mo.
Consultants in optics and biology	5-10 man-days

In the operational phase, the same personnel were needed with the exception of the photographer.

Students taught themselves with the programed manual, which was used in conjunction with photographic specimens, sequential-taped lectures, and open laboratories. Each student arranged self-paced learning, review, and scheduling. Discussion and interaction served to answer students' questions and encourage further study. Three kinds of instruction provided variation: one large group session introduced the week's topic, while self-teaching activities during the week and another group session at the end of the week solved student problems and probed current concerns.

Informal discussions at the Learning Resource Center added another learning situation. The project director rejected private carrels containing all materials as the study method at Center. He made the organization of the center more flexible by dispersing the tapes and slides throughout the space; movement between locations promoted sharing of observations.

Self-instruction, discussion, and interaction were a powerful combination involving the individual student in learning. The content of this learning was not unique, but the way varied presentations were coordinated and made relevant was. A typical section dealt with life processes: feeding, digestion, circulation, etc. The study of evolution led to a classification of species and a study of their interrelationships--ecological systems. Great effort was put into making ecology relevant.

Four weeks of the third term were devoted to a vital local concern: pollution of the Freeway Lakes near Albany. Through field instruction, the

class made a full-range pollution study of the lakes. The project staff and laboratory facilities moved to the field site for a week and were available to students on a "drop-in" basis. The students used a team approach. Each of 22 teams was assigned a different area of pollution study, such as aerial, soils, currents, PH.

Written recommendations were presented to the Linn County Parks and Recreation Department, and the Oregon State Marine Board subsequently held a hearing. The project director testified, using his students' information. As a result of the Marine Board hearing, the lakes were later closed to some sports and boats were restricted to ten miles per hour, eliminating water skiing.

COST

Once the materials are developed and the equipment purchased (if adequate resources are not available), operational costs may be less than for a lecture course. Extra supervisory staff will be needed for increased open laboratory hours, but this cost can be shared by a number of other courses in the department. A project director is needed to supervise, develop, and improve the program. Several courses could be coordinated under a single director using the laboratory staff.

In the operational phase fewer teachers are required than with typical methods of instruction. The salary of the extra laboratory staff required is less than that of increased teaching staff otherwise needed. If the course were nonlaboratory, and the same innovative instruction methods used, costs would be even lower.

The most favorable cost-benefit ratio is for large groups of students, since laboratory instruction, materials development, and duplication are key expenses.

A graphic representation of costs may help clarify them.

	Development Costs	Operational Costs
Linn-Benton Project	$8,000	Extra laboratory staff
Duplication of project	Duplicate materials, under $1,000 for one set	Extra laboratory staff 1/2 time--$4,000

Lecture tapes may be duplicated in one's own facility at a cost per tape of $4.00 maximum. Slides cost $.25-.35 per slide for duplication in outside facilities plus labor costs to arrange and number the slides. Costs per item vary with the method of duplication and decrease with greater numbers duplicated. For a student group of 200, twenty sets of tapes and slides are recommended.

The degree of responsibility required on the part of the student was a motivational problem for some persons, but many successfully managed their own learning experience. Performance ratings improved for 87 percent based on students' projections of probable comparative performance.

The major strength of this instructional approach is its successful application of learning principles. These include provision for learning "readiness," student control of learning pace, multisensory reinforcement, and clear concepts in the subject matter. The multimedia approach gave each student the opportunity to select the best method of learning for himself from a range of tactile, audio and visual resources, and allowed him to reinforce his learning with alternate resources.

Strengthening the problem-centered dimension of the program may remove many of the motivational difficulties which some students experience from lack of a rigid class structure. A stated problem gives the student a definite focus, so he can more easily order his learning. Relevant problems should increase motivation; student commitment to subject matter reduces the need for artificial inducement.

Unlike an instructional method which relies on discussion, one which uses tapes and slides can be readily duplicated. For courses other than first year biology, instructional materials would need to be developed. Extra staff for some courses, particularly nonlaboratory, may not be needed except during the developmental phase. During the development period the project director will need to focus on materials, using students' suggestions as an important aid. In operational phases materials and staff resources must be managed, but a self-instructional program means reduced teaching needs, thus liberating time for such management.

This project was specifically designed for commuter campuses but is applicable to any kind of campus, especially where individualized instruction without a large staff is desired.

The format of the project suits large numbers of students where multi-media tools are available. Smaller groups of related classes would work well sharing one project director, laboratory instructors, and a laboratory preparator.

This type of instruction would work well with any class in which a variety of sensory tools and experiences can convey the subject matter. The

approach stimulates and maintains student interest while reinforcing his learning.

Problem-centered subjects are specially appropriate to this instructional approach since they can give studies unity and an immediate relevance. Present revision of this project will stress the problem-centered aspect.

MULTIMEDIA PROGRAM FOR VOICE INSTRUCTION

L. Wynn and Ms. Ewan Mitton
Department of Music
Oregon College of Education
Monmouth, Oregon 97361

Music 190-391
Performance Studies-Voice

Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	O	Community College
	X O	Four-Year Institution
Level	X O	4th year
	X O	3rd year
	X O	2nd year
	X O	1st year
Area		Science
		Social science
	X O	Humanities
	X O	Education
		Technical/career
		Business Administration
Problem		Conceptual difficulty
		Diverse backgrounds
	X	Inflexible scheduling
		Need for personalization
		Issues ignored
		Lecture method inhibits learning
		Lack of relevance
		Loss of interest
	X	Realistic experience needed
	X	Alternative course structure needed
		Demand for theory-method consistency
		Other
Innovative Approach		Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
	X	Media/multisensory reinforcement
		Onsite/field study
		Problem centered
		Process centered
	X	Simulation
		Tutorial/independent study
		Computer
		Programmed instruction
		Large group/small group alternation
	X	Other **(alternative grouping)**

ERIC Descriptors

Music, Music Education, Vocal Music, Audiovisual Aids, Video Cassette Systems, Video Tape Recordings, Group Instruction, Small Group Instruction, Tape Recordings, Magnetic Tape Cassettes, Audiovisual Instruction, Multimedia Instruction

PROBLEM

The Music Department of the Oregon College of Education has developed electronic techniques for improving the instruction of music education students. This project extended the use of electronic media to the instruction of voice students. The department wished to test this approach, as well as a grouping innovation in voice instruction for their effects on student attainment of vocal skills.

INNOVATIVE APPROACH

Small group interaction and observation, plus the use of media feedback, were the basis for this project.

Intensive group interaction was expected to have several possible effects on vocal performance skills: motivation, increased learning through comparison of oneself with others, improved self-observation, improved attitude, and improved identification of specific vocal problems.

The use of videotape and cassette recordings was expected to influence performance through improved identification of specific vocal problems, observation of oneself as a performer, increased objectivity in observance of the students performing problems and strengths, and improved attitude.

New media were reviewed, evaluated, and selected for the program by the voice staff in three planning meetings. A videotape recorder and cassette tape recorders were selected.

Four groups of four students each were selected from the voice students enrolled at Oregon College of Education in the Fall term of 1970.

The students were selected on the basis of individual audition, musical aptitude tests and background, and experience in music:

Group 1 - Four women: similar background, ability, aptitude, and experience

Group 2 - Four men: similar background, ability, aptitude, and experience

Group 3 - Two men, two women: similar background, ability, aptitude, and experience

Group 4 - Four freshman women: two with previous training and two without[1]

Sixteen students were maintained on the conventional instructional method for comparison. These sixteen were selected as being comparable to the sixteen in the experimental groups. The control group did not receive the benefit of the media component.

Group classes were one hour per week instead of one-half hour as in the conventional private instruction.

A panel of three highly experienced voice teachers was appointed as an adjudication team. Their task was pre- and post-evaluation of performance skills of both experimental and control groups. These evaluations were conducted by listening to tapes made at the beginning and end of the first term, the end of second term, and the end of third term. At the end of the Spring (third) term the panel also evaluated the remaining students from videotapes made at the beginning and end of the school year.

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[1]It had been assumed that the groups should be homogeneous in ability, but Group 4 was included as a test of this.

Sample one-hour lesson for four students.

1. 10-15 minutes: Vocalizes--teacher developed, Vacci, Conconne, etc.--together and individually. Purpose is to check on each student to see if he can perform the exercise and to analyze individual problems.

2. 30-35 minutes: Check each individual student for problems on solo numbers. Work on some specific problems pertinent to the individual. Invite class comments. Each student may have a different song. However, part of the time they may all be working on the same song.

During Spring term, it was concluded, on the basis of the experience in the Fall and Winter terms that it was necessary to have an accompanist in the classroom to free the instructor for operation of the videotape and cassette recorders.

COST

Originally, staff time was reduced in this project almost one-half by the one-hour group approach.[1] However, the need for an accompanist implies an additional expense for four hours per week (based on four classes). The cost to the department may be minimized if work/study persons are available as accompanists.

An estimated conventional instructional method costs $30,000 per year in salaries for 324 student credit hours, or $92.62 per credit hour. A doubled teaching load, or $15,000 per year in salary, would yield a cost of $46.31 per credit hour.

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[1] "...almost one-half" because some staff time is needed for planning, managing, and program arrangements.

Equipment purchased, payment to adjudicators, secretarial help, and supplies came to $3,447. The equipment included tape cassettes, video tapes, tape recorders, a videotape camera and recorder, and a television monitor, as well as other miscellaneous equipment. There are no other expenses, and the only ongoing expenses would be maintenance and accompanists' fees.

EVALUATION/APPLICABILITY

1. Method
    a. A panel of qualified teachers evaluated individual vocal development, over time, of experimental and control students from tape and videotape recordings.
    b. At the end of first and third term, written tests of knowledge of vocal problems and singing concepts were administered to experimental and control students.
    c. Written comments from teachers and students were invited.
2. Results
    a. The experimental groups made slightly better progress and had a better knowledge of repertoire.
    b. Experimental students were more at ease in performing in student recitals.
    c. Experimental groups performed slightly better on tests of knowledge of vocal problems.

A group of four with unequal vocal ability or aptitude does not work well. Sex and voice classifications may be mixed.

Advanced students were not included in this experiment, but it appears feasible to use the group method to prepare problems, repertoire, style, and performance practices in addition to the one-half hour private lesson per week for work on personal vocal problems.

The grouping approach appears to improve exposure to knowledge of problems, repertoire, and style and improves performing poise. The comparison of students of similar ability seems to promote learning.

The media approach appears to promote vocal problem identification, constructive monitoring, and self-comparison, and, in general, to be of use in precise and responsive development.

The Innovative Vocal Instruction Method, incorporating a media innovation and a grouping innovation, is productive in terms of student development and provides a substantial cost reduction.

Special attention in planning should be paid to the use of the media devices in the curriculum. No adjustment of curriculum is necessary, but it is important that the media equipment use be closely coordinated with the curriculum.

This project developed a short list of guidelines for use by instructors in appropriate use of the videotape and cassette recorder.

MULTIMEDIA ARCHITECTURAL GRAPHICS

Intro. to Architectural Media
Arch 333
(Formerly Architectural
Graphics Arch 231)

Fuller Moore
Department of Architecture
University of Oregon
Eugene, Oregon 97403

Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	O	Community College
	X O	Four-Year Institution
Level		4th year
	X O	3rd year
	X O	2nd year
		1st year
Area		Science
		Social science
	X O	Humanities
		Education
	O	Technical/career
		Business Administration
Problem	X	Conceptual difficulty
		Diverse backgrounds
		Inflexible scheduling
		Need for personalization
	X	Issues ignored
		Lecture method inhibits learning
		Lack of relevance
		Loss of interest
		Realistic experience needed
	X	Alternative course structure needed
	X	Demand for theory-method consistency
		Other
Innovative Approach		Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
	X	Media/multisensory reinforcement
		Onsite/field study
	X	Problem centered
	X	Process centered
	X	Simulation
		Tutorial/independent study
		Computer
		Programmed instruction
		Large group/small group alternation
		Other

ERIC Descriptors

Architectural Education, Spatial Relationship, Visualization, Color, Light, Multimedia Instruction, Films, Slides, Models, Individual Instruction, Sequential Approach, Audiovisual Instruction

PROBLEM

Two main difficulties which students of architecture have experienced in visualization were addressed by this new method of teaching Architectural Graphics. The first difficulty was in the relationship between a three-dimensional object and its two-dimensional representation. Students asked to sketch a previously drawn object from a different viewpoint often grossly distorted the object. Having no mental image of it, they relied on rote memory of construction steps.

The relationship between color pigment and colored light was the second difficulty. Lectures showed the mixture and visual effects of color pigments, but not of colored lights. Since colored lights when mixed behave differently from pigments and have unique effects on different pigments, demonstrations of these phenomena were deemed necessary.

INNOVATIVE APPROACH

In order to teach students to visualize these procedures and effects, the Architecture Department of the University of Oregon utilized a multimedia approach.

The steps involved in building up the student's understanding were carefully structured and coordinated. The learning process was seen as a cumulative process of perception and recognition where the student depended on many cues to form a Gestalt whole. It was especially vital to make certain that each step was understandable and that together the steps formed a coherent whole.

A multimedia approach was chosen because one medium alone could not offer students the insights possible with a multifaceted approach. Slide and film sequences, three-dimensional models, and handout sheets--all relating to the same subject--would ensure the variety of approaches necessary to form a complete picture of the process in question.

Existing teaching methods were surveyed by means of a search of the literature, as well as a questionnaire sent to various architectural schools. Those schools whose interests paralleled those of the project developers were contacted further.

Techniques and instructional aids were developed during the summer preceding Winter term 1970, when the course, Introduction to Architectural Media 333, was first taught with this new method.

The first task for innovation was to help the student relate a three-dimensional object to a drawing. A real object (a building on campus) was visually abstracted to its basic structure using a series of increasingly simplified three-dimensional models. Once the students visualized the complex object as a set of simplified "defining edges," these edges could easily be represented as lines. This sequence could then be reversed, reconstructing the building in two-dimensional drawing form. Students could reconstruct such an object or spatial situation by progressing from a "line" drawing to a "surface" drawing using the perceptual cues (such as overlapping, size, perspective, etc.) which had become meaningful to them through readings and discussion of perceptual theory.

Besides being used as lecture aids, the models were photographed to form a film sequence and a series of slides. The film and slides were combined with model demonstrations to reinforce this step-by-step progression.

The next problem was that of colored lights. Gelatin filter transparencies and color slides were used to demonstrate the "additive" and "subtractive" mixing of colored light and colored light's appearance on objects. A demonstration light box was available for individual student experimentation with colored lighting effects.

COST

Of the $5,000 granted to Architectural Graphics, approximately 60 percent went for development. The development costs were allocated as follows: 33 percent for personnel, 47 percent for materials and reproduction, and 20 percent for equipment.

For a school seeking to duplicate the University of Oregon program, the amount spent on materials and reproduction would be proportional to both the number of aids utilized and student enrollment. Part of the expenditure was $350 to order copyrighted visual aids from Science Research Associates. It was impossible to develop similar materials within the limitations of the grant, so the University of Oregon purchased SRA's "Perspective Drawing Series."

The equipment which the University of Oregon purchased, cameras to make films and slides, might not be needed since some of the University of

Oregon materials could be duplicated. However, overhead projectors were furnished without charge by the Audiovisual Department of the University. A school without a projector would have this added expense.

The operational costs, $2,000, were entirely for the salaries of the project director and his assistant.

EVALUATION/APPLICABILITY

To determine the effectiveness of these new teaching methods, a test was developed to measure the level of student improvement in project-related areas. The test was given at the beginning and end of the term, both to the experimental group and to a control group which used the old methods of learning.

The experimental method proved to be a very effective way of communicating the concepts of architectural graphics. The favorable opinion of students and teachers was confirmed by test results. The mean total improvement for the control group was 14.3 percent; for the experimental group, 24.3 percent.

The strongest point of the course was the slide sequences. They communicated necessary concepts much more effectively than verbal methods had done. The conjunction of these with 3-dimensional models and handout sheets produced a highly effective instructional method.

The kind of teaching aids developed for this course could be developed for a variety of subjects, for example, technical drawing, mechanical assembly procedures, and home economics. Any course which requires a clear

visualization of procedures would greatly benefit from this approach. The essence of this learning theory is that approaching a problem from a variety of directions reinforces learning and combines to give the student a comprehensive understanding of the subject.

The project's final report gives a clear, detailed account of the materials and procedures developed, most of which could be duplicated. Relatively inexpensive, the program is not difficult to implement once the materials are developed. Construction of models would require short-term student assistance and no additional instructional staff would be necessary.

VISUAL ARTS

Visual Arts Seminar
Art 425x, Art 426X and
Basic studio courses

Berkley W. Chappell
Department of Art
Oregon State University
Corvallis, Oregon 97331

Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	O	Community College
	X O	Four-Year Institution
Level	X O	4th year
		3rd year
	X O	2nd year
	X O	1st year
Area		Science
		Social science
	X O	Humanities
		Education
		Technical/career
		Business Administration
Problem	X	Conceptual difficulty
		Diverse backgrounds
		Inflexible scheduling
		Need for personalization
		Issues ignored
		Lecture method inhibits learning
		Lack of relevance
		Loss of interest
		Realistic experience needed
	X	Alternative course structure needed
	X	Demand for theory-method consistency
		Other
Innovative Approach	X	Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
	X	Media/multisensory reinforcement
		Onsite/field study
		Problem centered
	X	Process centered
		Simulation
		Tutorial/independent study
		Computer
		Programmed instruction
		Large group/small group alternation
	X	Other **(upper level students as teaching resource)**

ERIC Descriptors

Art, Fine Arts, Tape Recordings, Individual Instruction, Slides, Audiovisual Instruction, Student Developed Materials, Art Materials, Student Projects

PROBLEM

High enrollment in basic studio courses in the visual arts had led to multiple sections with numerous instructors at Oregon State University. This situation brought about a lack of coordination among sections and a lack of direction within them. For the student, the relationship between theoretical knowledge and practical application became increasingly unclear.

A program was needed which would reexamine course philosophy and unify the various approaches to the studio courses.

INNOVATIVE APPROACH

Project developers decided to use student-developed tape synchronizations which would present basic concepts of art to students in studio courses. In the words of the project proposal, a tape synchronization is:

> "...the coordination and synchronization of visual information to a verbal format recorded on tape. Slides are selected, arranged in proper sequence in trays and then synchronized to the audio portion of the presentation. The tape synchronization is used for a variety of purposes, most of which are rather ordinary in their use. But it can be much more than just a slide show set to sound. Not only can it become an effective educational tool, it can also become a 'work of art' when handled with sensitivity. In its ability to communicate on a more aesthetic level, the tape synchronization will be an admirable and effective means by which participating students will be able to articulate knowledge."

Tape synchronizations would standardize the presentation of theoretical concepts and relate the concepts to practical application. Development of the tapes by students in a seminar situation would provide student-faculty examination of philosophies underlying basic studio courses. Student developers would also gain experience in communication of the material to students at the basic studio level.

In the summer of 1970, course content and goals were designed for an undergraduate seminar for ten to fifteen advanced students. These students were to be responsible for developing, as a course requirement, tape synchronization presentations.

The following fundamental concepts were to be covered in the presentations:

point
line (shape)
plane
space
texture
color
emphasis (expression)

Equipment was also selected and purchased.

In the subsequent Fall term, September-December, 1970, this class was held, and students working individually and in groups developed their presentations. Nearly all constraints attendant upon traditional courses were removed. The students were free to work whenever they wished and to develop their presentations as they wished. The instructor made himself available as a resource person whenever a student needed him and functioned rather to facilitate ideas than to direct students.

The synchronized presentations were made available the following term, January-March, 1971, in basic studio courses. Instructors of these courses who wished to show the presentations to their students were free to do so but no one was required to do so. Presentations were made at Oregon State University and at neighboring high schools.

An evaluation plan was put into effect with the tape synchronizations which instructors, students, and nonparticipating evaluators carried out. The final three months, April-June, 1971, were spent by the project director in evaluating the impact, relevance, and implications of the entire project.

COST

The project budget was $7,917.96, of which $4,206 was paid for salaries; $920 bought supplies including duplication and reproduction fees; and the remainder, $2,791, covered purchase of equipment.

The equipment, which was of excellent quality--though not the most expensive on the market--was expected to provide much service to the college.

Ongoing expenses for the operation of the project are small. No new personnel are needed, and presentations which have been produced may be used over and over again. Presentations do not lend themselves to modification, except for substitution of a slide here and there. On the other hand, new presentations could be devised at any time, and additional costs would involve only the cost of film, development, and duplication, if necessary.

EVALUATION/APPLICABILITY

Evaluation was carried out by students, instructors, and by nonparticipating evaluators. The emphasis of evaluation results was that the project was a success, and perhaps the project director was somewhat modest when he described it as "at least a mild success."

A surprising and somewhat disconcerting fact was that among groups evaluating the project, students who were art majors were least enthusiastic about it. A related disappointment was the initial adoption by only 50 percent of the instructors who might have availed themselves of it. These facts are balanced by its enthusiastic reception among high school students. What this information suggests is that the innovative approach here has or can have great impact on an aesthetic level, but that majors in the field may be put off by something that is not of immediate practical value to them.

The project director suggested that participation might be improved by work directed at "turning on" the faculty. This project was developed for [illegible]cability, and it stands or falls on the basis of who does or does not avail himself of the presentation which now exists. Now after almost two years, the slide-tapes are being used by the general faculty.

The tape synchronization method is applicable and might profitably be developed wherever an aesthetic, subjective dimension could broaden the understanding of basic concepts. Most presentations used a musical background of some sort to accompany the slides, and prospective planners might explore the possibility of other accompaniments. The temptation to use verbal explanation presents a danger, however, because it may detract from the visual impact of the slides, destroying the "aesthetic" dimension and becoming a lecture with slides.

PROJECTION TUTORIAL IN BIOLOGY

Bot 201, 202
General Biology

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Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	O	Community College
	X O	Four-Year Institution
Level		4th year
		3rd year
	X O	2nd year
		1st year
Area	X O	Science
		Social science
		Humanities
		Education
		Technical/career
		Business Administration
Problem		Conceptual difficulty
		Diverse backgrounds
		Inflexible scheduling
		Need for personalization
		Issues ignored
		Lecture method inhibits learning
		Lack of relevance
		Loss of interest
		Realistic experience needed
	X	Alternative course structure needed
		Demand for theory-method consistency
	X	Other **(eliminate redundance)**
Innovative Approach		Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
	X	Media/multisensory reinforcement
		Onsite/field study
		Problem centered
	X	Process centered
		Simulation
		Tutorial/independent study
		Computer
	X	Programmed instruction
		Large group/small group alternation
		Other

ERIC Descriptors

Biology, Biology Instruction, Microscopes, Laboratories, Laboratory Manuals, Laboratory Procedures, Programed Materials, Discovery Processes, Inductive Methods, Group Discussion, Small Group Discussion, Slides, Audiovisual Aids, Group Instruction, Science Laboratories

PROBLEM

The rising costs of laboratory courses have caused science faculties to reevaluate the design and content of the traditional laboratory experience with the aim of providing equal or superior instruction at a reduced cost per student.

INNOVATIVE APPROACH

The biology faculty at Eastern Oregon College felt that a considerable waste of student effort occurred as a result of unnecessary repetition of already mastered microscope techniques. It was decided to convert 30 percent of all existing laboratory experiences in the Biology Department into "projection tutorial" laboratories. Students would immediately be presented with the correct study material in the form of projection transparencies (slides), and would save much time otherwise spent in obtaining microscope slides and trying to locate the desired study objective.

This approach does not alienate the student from the microscope or result in insufficient training in its use. The student is merely relieved of unnecessary time spent with the microscope.

A pilot study suggested that the "projection tutorial" approach would be successful, and the grant from the Educational Coordinating Council enabled planners to design ten innovative laboratories during the summer of 1970, and to implement them in general botany classes during the Fall and Winter terms.[1] In practice, however, because of the enthusiastic reception

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[1] 38 students took the course in the Fall, 41 in the Winter term.

of the method, twenty labs were designed, many of them also to be utilized in other courses. By the time of the final report (May, 1971) 5,200 slides had been produced in sets (usually five per set) or as originals for preparation into new or modified sets for more labs. Some 766 sets had been organized.

Students learned the use of 35mm projectors and studied in groups of three to four per projector. This had an extremely positive effect on student learning. A natural give-and-take discussion occurs in small groups like this, and in the Educational Coordinating Council project the slower student was tutored by other students in the group. Faster students were challenged by the requirement that they be able to explain material clearly. All students were quicker to pose questions when something was unclear.

In actual laboratory situations at Eastern Oregon College, the instructor was able to spend his time much more efficiently than had heretofore been the case because he could spend time answering questions for groups, instead of answering the same question over and over for different individuals.

The projections were supplemented with programed instruction guides containing laboratory procedure, labeled sketches, and information regarding each structure or object to be studied or emphasized in the observations. There are also references to other study materials.

This approach had the benefit of allowing progress, if not at the rate of the individual, at least at a group rate. Results indicated that faster members of the group aided the progress of slower members.

The "projection tutorial" method emphasizes two objectives: 1) exactness, in that only required material is presented (though supplementary material

is always available); and 2) completeness, since material is presented as a unit to the student, who must then take responsibility for his own learning progress. As laboratories were developed, they became more and more process oriented, requiring serious contributions from the student.

COST

The cost of implementing this approach would be contingent upon existing equipment at the school desiring to implement. At Eastern Oregon College it was necessary to purchase a research-quality microscope, objectives and oculars, and a camera with attachments. Projectors were available. The purchased equipment cost $2,991. Services and supplies in the amount of $175 were obtained, and $500 in duplicated materials were provided by the institution. The Educational Coordinating Council and the institution shared equally the project director's salary of $2,460, and a student assistant was paid $240 for 160 hours of work. The total budget was $6,636, and ECC provided $4,783 in the form of a grant.

The project's success brought further commitment from personal sources and from the institution. Additional photographic equipment, including a 16mm movie camera for the production of single-concept films, was purchased in the amount of $2,663.

Although the cost of equipment for this project is relatively high, the actual and potential returns are great and the expense appears justified. The equipment can serve many areas of the department. The laboratories developed were used by several courses, and a new course, "Biological Photography," was instituted. Instructional materials which were developed

are reproducible and may, therefore, reach students outside the institution. Finally, the equipment, with a modest maintenance charge, is of a flexible nature and can potentially serve in a variety of ways depending on the imagination of its owners.

Ongoing costs of the laboratories are slight. Revision of laboratories would require the purchase and development of film and the partial rewriting of laboratory manuals.

EVALUATION/APPLICABILITY

The program was set up in such a way that students spent half a term in an innovative laboratory and half a term in a traditional laboratory. Testing could then indicate success of one versus the other, as well as individual performance in each situation. Students tested consistently higher in "projection tutorial" laboratories according to figures in the final report, and the average scores for the innovative labs were 11.9 percent higher than scores for traditional laboratories. This would make a difference of one full grade on an A-B-C-D-F scale. Of further significance was the indication that student performance decreased when the second half of a term was spent in a traditional laboratory after half a term of "projection tutorial" laboratory.

Student acceptance of the new procedure was very favorable.

This project indicates that the "projection tutorial" approach apparently helps produce better learning. It appears applicable in any situation where reproduction of an experiment is so time consuming or cumbersome that it interferes with the material which ought to be learned. The danger of this approach is that it takes equipment out of the hands of the student, but when

well administered, it maximizes student efficiency in handling equipment, and eliminates redundant use of equipment when learning concepts and ideas.

The laboratories developed at Eastern Oregon College, along with the laboratory manual, could be adopted as they stand, the only requirement being the availability of projects and instructors willing to give time to groups and to guide students into discovery.

8. INTEGRATED CURRICULUM/LEARNING PACKAGES

Individualized Curriculum for Electronics (81) p. 193

Mathematics Module Program (82) p. 201

Developmental Writing (83) p. 209

Fundamentals of Nursing (84) p. 221

Integrated Geography (85) p. 229

Related Projects:

Writing and Listening Skills (23) p. 33

Simulated Law Enforcement Experience (42) p. 97

Visual Arts (74) p. 177

Writing and Mathematics Tutorial (24) p. 41

Integrated Chemistry Laboratory for Non-Majors (93) p. 253

Continuous Program for Physical Science (31) p. 49

INDIVIDUALIZED CURRICULUM FOR ELECTRONICS

Presently used in numerous high schools, community colleges and colleges

James Morris
Division of Continuing Education
Publications
Waldo Hall 100
Corvallis, Oregon 97331

Applicability			X Describes this project O Potential use of this approach
Institution	X	O	High School
	X	O	Community College
	X	O	Four-Year Institution
Level			4th year
			3rd year
			2nd year
	X	O	1st year
Area		O	Science
			Social science
			Humanities
		O	Education
	X	O	Technical/career
		O	Business Administration
Problem			Conceptual difficulty
	X		Diverse backgrounds
	X		Inflexible scheduling
	X		Need for personalization
			Issues ignored
	X		Lecture method inhibits learning
			Lack of relevance
			Loss of interest
			Realistic experience needed
	X		Alternative course structure needed
			Demand for theory-method consistency
			Other
Innovative Approach	X		Integrated curriculum/learning package
	X		Interdisciplinary/interinstitutional
			Media/multisensory reinforcement
			Onsite/field study
			Problem centered
			Process centered
			Simulation
	X		Tutorial/independent study
			Computer
			Programmed instruction
			Large group/small group alternation
			Other

ERIC Descriptors

Electronics, Integrated Curriculum, Interinstitutional Cooperation, Individual Instruction, Multimedia Instruction, Community College, Student Centered Curriculum, Student Participation

PROBLEM

Students coming to community colleges for job training are of extremely diverse background, and the colleges have lacked techniques for handling the heterogeneity. There has been no system for advanced placement of students with previous training, nor has there been provision for students to enter programs at different times of the year.

These conditions directed the emphasis of existing technical training programs away from the student, away from his/her particular background and into narrow course outlines which disallowed individual rates of progress.

INNOVATIVE APPROACH

Planners in the field of electronics sought to correct this situation by developing a student-oriented curriculum using a series of learning packages to cover the material of the first-year electronics course. The Individualized Curriculum for Electronics (I. C. E.) would be usable at colleges, community colleges, universities, and high schools.

The packages were designed to fit the subject matter to the student, who would begin any time during the year on the unit geared to his tested abilities. Once begun on the right unit, the student could progress through the information and experiments of the unit at his own pace.

There are many advantages to this approach. It encourages the student to take a lead role as a learner under the guidance and support of the teacher, thus enabling him to concentrate on challenging material. The teacher, in turn, gains the freedom to assist students individually, helping them learn at their own level. The task of puzzling over grades is eliminated, too,

because under this system the teacher works with the student until the concepts are learned. Such an approach clearly lends itself to inter-institutional coordination of curriculum.

A team of electronics instructors was selected representing each of the state's community colleges. Thus a person who would be helping his own college implement the program was on hand to help plan it. Valuable suggestions were added by an advisory committee with members from industry, the state employment service, and education.

With the assistance of specialists in learning psychology and instructional systems, planners worked out a uniform approach for the packages, and decided which areas of electronics the program would cover. In making these decisions, planners took into account basic concepts, as well as information about electric-electronics positions most available in Oregon.

The development of the packages took place at Lane Community College from June 25 to August 28, 1970. Each package was designed to teach a specific concept through a variety of materials and methods. Three tests accompanied each package--a pre-test to determine the student's knowledge of the concept before the package; a post-test to determine knowledge gained; and a self-test to enable each student to check his mastery of the subject.

Student counseling forms were used to help place the student, and "Prescription Sheets" were designed for teachers to help the student plan a sequence of packages which would match his goals.

Each package was scrutinized as it was being written. At least three people read it to see if it taught its proposed concept. All learning packages were continually examined to ensure their interrelation.

One of the most significant aspects of development was its field test in LCC summer sessions. From the beginning, the importance of feedback was realized. It was felt that if the program were to get "out of touch" with the students, it would degenerate into a welter of useless materials. The student feedback in Lane Community College helped the writers resolve a number of problems before final printing.

Several methods were devised to ensure continuing feedback. After completing a learning package, students would be asked to fill out an evaluation form. Instructors, individually and collectively, would continue to appraise the program; indepth interviews with random students would solicit student reactions.

By the end of August, 138 learning packages, as well as tests and feedback mechanisms, had been designed. The program began Fall term, 1970. I. C. E. workers made trips to each school to help set up the actual procedures in the electronics laboratories. The material was used by 350 students at nine participating colleges.

The expanded I. C. E. program was field tested in 1971-72 by six Oregon colleges and ten high schools, with approximately 700 students. Inservice meetings instructed teachers, administrators, and counselors of pilot schools on how to implement the project effectively. I. C. E. had increasing success in coordinating the state's vocational education in electronics.

There is every indication that the program will continue to grow and improve. Existing materials were completely revised during the summer of

1972. The Oregon Board of Education has committed itself to establishing an editorial board for I. C. E., developing audiotapes, adding more technical areas, making the material available to all colleges and high schools in Oregon, cooperating in teacher inservice training, investigating nationwide publication, and encouraging other schools in the nation to demonstrate the program's feasibility.

COST

The cost of I. C. E. materials is currently set at $.25 per learning package. A school wanting to implement this program will want to buy several complete sets of all materials, as well as quantity copies for student use. A possible cost is inservice training for the teacher. A workshop in student-centered learning is now available at Oregon State University for teachers who plan to use I. C. E. materials.

The cost of setting up I. C. E. over the past two years has been $100,000. All of these funds were spent in program development, most in the first summer, some for revision in the second summer. Approximately 62 percent went toward salaries, and 38 percent purchased material, supplies, and equipment for the packages.

EVALUATION/APPLICABILITY

The I. C. E. project has received statewide recognition for its success and impact. In 1971 and 1972, the presidents of all of Oregon's community colleges identified I. C. E. as the number one model for further curriculum development. This praise extended to commitment: the

presidents agreed that monies should not be given to individual schools, but should be pooled for cooperative curriculum development.

The continuous process of feedback and response or revision helped make the program a success by increasing its fit to the needs of the students and teachers. Rather than a finalized "objective" evaluation, the program used the ongoing cycle of input and output to perfect its approach and content.

From the beginning, the project staff realized the importance of teacher and student feedback. Individual teachers were the ones who made the innovations function. This concern for teachers' involvement led to making them a vital part of the evolution of the project. The teachers who would do the actual teaching wrote the materials. Participation continued as instructors met during the academic year to share their problems and insights.

Student feedback came through student evaluation of each package and through interviews with random students. The original student evaluation form was too lengthy and detailed, so it was rejected in favor of a simpler version. The evaluation forms were tabulated for each package and the results used for revising it.

The general questions on the evaluation form, together with the interviews, indicated that some students adapted to the new learning method more easily than others. Older students generally liked the independence offered them, while many recent high school graduates felt dazed by the freedom. The students accustomed to passive learning became independent only after some exposure to the I. C. E. program.

I. C. E. 's selection by community college presidents as a model for further curriculum development demonstrates its desirability and applicability.

I. C. E. is a model in more than one way--it is a planning model for assessing needs and finding resources; it is a model for teamwork, for disseminating ideas, for channeling feedback, and for flexibility. On a larger scale, it is a model for cooperative curriculum and for vocational education. Schools wishing to evolve a curriculum for a number of schools can learn much from the I. C. E. approach. As for vocational education programs, the I. C. E. design may be the most promising approach for this relatively new concern. It resolves the problem of coordinating curriculum with previous training and permits new materials to be added as job duties change.

Schools wishing to implement the electronics project can obtain the materials from Individualized Curriculum for Electronics, Continuing Education Publications, Waldo 100, Corvallis, Oregon 97331.

MATHEMATICS MODULE PROGRAM

Math 4.200, Math 4.202, Math 4.204
Basic Math (Arith), Math I (Elem. Alg.), Math II (Elem. Alg.)

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Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	X O	Community College
	O	Four-Year Institution
Level		4th year
		3rd year
		2nd year
	X O	1st year
Area	X O	Science
		Social science
		Humanities
		Education
	O	Technical/career
	O	Business Administration
Problem		Conceptual difficulty
	X	Diverse backgrounds
	X	Inflexible scheduling
		Need for personalization
		Issues ignored
		Lecture method inhibits learning
		Lack of relevance
		Loss of interest
		Realistic experience needed
		Alternative course structure needed
		Demand for theory-method consistency
		Other
Innovative Approach	X	Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
		Media/multisensory reinforcement
		Onsite/field study
		Problem centered
		Process centered
		Simulation
	X	Tutorial/independent study
		Computer
		Programmed instruction
		Large group/small group alternation
	X	Other **(alternative grouping)**

ERIC Descriptors

Integrated Curriculum, Mathematics, Algebra, Arithmetic, Remedial Mathematics, Individual Instruction, Mathematics Materials, Mathematics Curriculum, Arithmetic Curriculum, Diagnostic Tests, Mathematics Instruction, Community Colleges

PROBLEM

The Mathematics Department at Portland Community College faced special problems created by student diversity. Students needing one section of a course had to take the entire term; students ill or otherwise unable to attend a course had to repeat it entirely; passing students who had failed only one section of a course had no way of focusing on that section.

Diversity was also responsible for other familiar problems. Some advanced students were not challenged by course curriculum, and some disenchanted students had not been offered either encouragement to learn or a program appropriate to their experience.

INNOVATIVE APPROACH

A new program was developed centering around learning packages, each devoted to a specific topic. With these packages, students would do exactly the work they needed to do, at the speed and level appropriate to their backgrounds.

Each package was designed to last one to three weeks. A diagnostic test indicated which package the student was to begin with. After studying the prescribed package, the student was tested over the material in the package. If he passed, he progressed to the next package: if he failed, he repeated the package without any penalty. In this way the student could progress at his own speed.

In the summer of 1969, before the Educational Coordinating Council grant, the package material was written--the diagnostic tests and the exams (four variations on each exam). Sixteen packages were designed for the three

math courses--4. 200 (Arithmetic); Math I, 4. 202 (Elementary Algebra); Math II, 4. 204 (Algebra).

After a one-year trial with 600 students, Portland Community College saw the need for evaluation and research. Funding from the Educational Coordinating Council grant allowed them to iron out difficulties in the program and to test its effectiveness.

Particular problems existed. Package lengths varied with the topic, making systematic scheduling unworkable. The packages had to be made the same length and subject matter rearranged to fit the time. In addition, a method had to be devised to correct the "scattering" phenomenon--the tendency of students to spread out, with time, over more packages. The smallness and number of groups created staff and space problems.

A three-person team assisted the project director in revising the schedule and changing the tests during the summer of 1970. The course contents were altered so that all packages could be scheduled into two-week units. Review units were developed for students repeating packages. A statistical analysis of the old package tests indicated improvements which were embodied in the new, uniform, multiple-choice tests. Diagnostic tests were revised (one for Arithmetic and one for Elementary Algebra) to be more specific, so that the staff could place the students more accurately.

Because the program was designed for large numbers of students, a strain on the package structure of the program occurred in 1970, when Portland Community College split half its faculty and courses to a new campus.

But teachers responded by donating extra hours to teach the smaller groups, so that the original schedule could be carried out.

As planned, all students who registered for Math 4.200 or 4.202 were diagnostically tested on arithmetic. Students failing the whole number section were advised to take a special class on basic operations; those failing a different section were directed to 4.200; and those passing all sections recommended for 4.202 were given the diagnostic test on algebra, and their scores used for placement.

At the end of a term, a possible solution to the student "scattering" problem was tested: students lacking one package for completion were offered a special three-day, nine-hour program during vacation. After nine hours of class they took the package test. Later, tapes were developed to provide reinforcement and a resource to move ahead faster if desired.

COST

The $10,000 granted to Portland Community College was spent entirely on revision during the summer of 1970. About 67 percent was spent on the salaries of the three-person team who changed the scheduling and improved the diagnostic and package tests. The remainder paid a secretary for time spent in typing the course outlines and tests.

The costs to a school wishing to duplicate the program would be mostly for reproduction of the existing materials. The school's project director might release time for fitting the program to the level and needs of his students.

If the packages were offered in a large-enrollment class, no extra teaching staff would be required. If not, more teachers would be needed. But the extra cost would mean a more individualized program further benefiting students.

EVALUATION/APPLICABILITY

The innovation relied on competent machinery for smooth scheduling, accurate tests, and special programs. The very advantages of the program--flexibility and diversity--could have become flimsiness and confusion without careful planning. Time and imagination were required to implement a system which coordinated the package parts into an effective whole.

The students' strong approval indicated that the packages had achieved their most pressing goal--to engage the interest of disenchanted students, as well as of average students. Ninety-two percent of the students polled said they would recommend the package program to friends either with difficulties or with average ability in mathematics. Of the 155 repeating a package, 95 percent thought it was better than repeating the whole course. The majority (53 percent) preferred the non-grading system.

Comparisons were made between students enrolled in mathematics courses in the years 1967-68 and 1968-69, and students in the same courses using the innovative approach throughout 1970. Results on the comparisons were mixed. In Math 4.200 there was a higher level of success only in the Fall term for students in the new program. Winter and Spring terms saw success for the learning package approach fall below levels achieved previous

years. Planners felt this was due to a higher minimum for passing under the new program.

First term Elementary Algebra, Math 4.202, was completed with a higher rate of success by students in the new program throughout the year, while second term Algebra, Math 4.204, showed no difference in success between students in the regular program and students in the new one.

Introductory courses which are divisible into distinct sections are most appropriate for a package program. Packages are an effective way of getting students to enter a program at the point which corresponds best with their achievements and abilities.

The package structure works best with large numbers of students since it allows for the students' later dispersion as they progress differently.

Other schools could easily shift their basic mathematics course to a package program using the material which this project has developed. Schools initiating this method in other disciplines can learn from this project's experience with standard package lengths, review units, and special programs for regrouping dispersed students.

DEVELOPMENTAL WRITING

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Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	X O	Community College
	O	Four-Year Institution
Level		4th year
		3rd year
		2nd year
	X O	1st year
Area		Science
	X O	Social science
	O	Humanities
	X O	Education
		Technical/career
		Business Administration
Problem	X	Conceptual difficulty
	X	Diverse backgrounds
		Inflexible scheduling
		Need for personalization
		Issues ignored
		Lecture method inhibits learning
		Lack of relevance
	X	Loss of interest
		Realistic experience needed
		Alternative course structure needed
		Demand for theory-method consistency
		Other
Innovative Approach	X	Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
		Media/multisensory reinforcement
		Onsite/field study
		Problem centered
	X	Process centered
		Simulation
	X	Tutorial/independent study
		Computer
	X	Programmed instruction
		Large group/small group alternation
		Other

ERIC Descriptors

Writing Skills, Community Colleges, Diagnostic Tests, Tape Recordings, Interinstitutional Cooperation, Individual Instruction, Developmental Reading, Tutoring, Independent Study

PROBLEM

Statistics indicate that students entering community colleges are often handicapped by lack of ability to communicate effectively. Students returning from military service or those beginning a college career postponed by marriage frequently have lost confidence in their writing ability. Those who have just graduated from high school have often been inadequately prepared for expository writing and may lack an incentive for self-improvement or the maturity to adjust quickly to pressures of the college writing class. Both instructors and low-achieving students attribute failure to master basic writing skills as the major factor contributing to academic inadequacy.

A method of instruction was needed which would provide students not only with basic skills but with an understanding of the basic principles and techniques of informative prose.

INNOVATIVE APPROACH

To meet the need for improvement of remedial instruction in writing, a consortium was formed consisting of Mt. Hood Community College, Clackamas Community College, and Portland Community College. Principal objectives of the Three College Consortium were:

1. To initiate cooperation among the three metropolitan community colleges in the area of preparatory English,
2. To adopt or devise an effective placement test,
3. To determine the necessary components of a comprehensive remedial writing program,

4. To select texts and develop supplementary materials for the proposed preparatory writing course and to prepare an instructor's manual and a bibliography of other helpful materials, plus suggested techniques and approaches.

During the spring and summer months of 1970 preceding implementation of the Developmental Writing (WR 11) course, a team of two instructors from each of the three schools met at workshop sessions to select curriculum materials and procedures which might offer students with language handicaps experiences most apt to increase writing expertise.

New placement techniques were necessary, both to make accurate recommendations for placement of students in appropriate writing courses and to evaluate progress effectively at the end of the course. It was established that by utilizing a team of English instructors to make independent judgments of a freshman's writing sample, in addition to considering his Nelson-Denney Reading Test scores and high school achievement record, an accurate assessment of writing ability could be effected.

Tapes, charts, stencils, and transparencies were prepared for the dual purpose of enhancing classroom work and encouraging independent laboratory studies. Texts, supplies, and equipment for laboratory purchase were selected. Also, charts were designed for reporting progress of individual students, and forms were created for faculty and student evaluation of the program.

Language deficiencies in reading, listening, spelling, and punctuation were isolated in order to compile or prepare programed, independent study units to which individual students might be directed.

It was determined that students would participate in lecture-discussion groups for two hours each week and spend one two-hour session per week in writing laboratories. Classroom experiences would center almost exclusively on writing, but laboratory sessions would be varied--one student might be tutored in generative writing, a second might be directed to an independent study unit in punctuation or reading, while a third and fourth might work together to improve their spelling ability.

At the beginning of the Fall term, it was clear that students in Writing 11 would participate in a carefully structured and monitored writing program centered around the writing of well-developed expository paragraphs and designed to offer maximum opportunity for success in required writing courses after only one term of remedial study.

Placement procedures for students in Developmental Writing classes were implemented in different ways at the three schools. A counseling appointment for each new pupil was scheduled at Clackamas Community College. As individuals or in small groups, students first took the Nelson-Denney Reading Test, then the Writing Placement Sample, Version A. Performances were evaluated by English instructors who made recommendations in terms of students' demonstrated abilities and vocational or academic orientation.

Portland Community College did not give the Nelson-Denney Reading Test and did not use high achievement as a basis for determining placement

in writing classes. Instead, each entering freshman was required to write a paragraph in response to writing samples at registration. While the student waited, the writing sample was read and evaluated by an English teacher who made a judgment, explained to the student the option to which he was being recommended, and presented the student with a card granting entry to the course.

Entering freshmen at Mt. Hood Community College were scheduled in groups of 75 to 100 for half-day counseling sessions at which they were given the Nelson-Denney and writing sample tests. Students then were separated into smaller groups of six to ten while writing samples were analyzed by three English instructors. In addition, considerations were given to high school English grades, cumulative high school records, and scores in the Nelson-Denney Reading Test. Writing course placement recommendations were forwarded to the appropriate counselors for discussion with individual students.

During Fall term, classroom instructors of the Wlt 11 course meticulously followed the course of study, methods, and procedures outlined in the instructor's manual prepared earlier. Both students and teachers found that selected texts and materials developed by the Consortium were helpful and stimulating. Also, instructors were impressed by the practicability of making multiple copies of student themes for classroom analysis on the Gafax 600 or 3M duplicating machines.

None of the three colleges could offer the optimum laboratory facilities projected in program plans. There was no secluded area in the Study Skills

Center at Portland Community College in which students with language problems could discuss difficulties among themselves or with their instructor. Because the atmosphere appeared to intimidate WR 11 students, the laboratory approach to writing was eventually abandoned by Portland Community College.

The laboratory at Mt. Hood Community College was temporarily housed in quarters that were slated to become a green room for the college theater. Space was limited and facilities for necessary equipment were inadequate. However, during winter term, Mt. Hood moved to spacious new laboratory quarters which incorporated all of the study areas planned for the program in addition to a workroom which could be utilized for preparation of transparencies, duplication of student themes, and storage of equipment.

Clackamas Community College alone proved the potential of laboratory experience in writing effectiveness in the Fall term. In addition to equipment and supplies acquired for the Developmental Writing project, students were able to use materials purchased or prepared for other groups with language disabilities. Laboratory experience was guided by the same instructors who offered classroom sessions, enabling teachers to become well acquainted with students and their performances.

At the end of Fall term both Clackamas and Mt. Hood concluded that Consortium proposals with regard to laboratory instruction and experimentation were too highly structured and demanding. The second term of WR 11 focused on scheduling only one hour of laboratory time to the direct study of listening skills and three to the improvement of reading speed and comprehension. Study of grammar and punctuation were tied closely to consistent errors found

in students' themes. Also, large portions of each laboratory session were devoted to analyzing and revising student paragraphs.

At the conclusion of the course, scores on B versions of the diagnostic tests indicated that nearly all students had made definite gains in each of the skill areas, even those to which little or no formal study had been devoted.

COSTS

Because Portland Community College withdrew from the project, the original budget estimate of $37,805 was reduced to an actual expenditure of $22,214.33. Expenses for the three institutions were divided as shown on the following chart.

DEVELOPMENT OF MATERIALS AND PROCEDURES
FOR PREPARATORY INSTRUCTION IN WRITING SKILLS
FOR CONSORTIUM

EXPENDITURE	PORTLAND	CLACKAMAS	MT. HOOD	TOTAL
Salaries				$12,156.68
Project Director			$1,950.00	
Project Staff	$1,350.00	$2,750.00	4,130.90	
Secretary		183.75	492.03	
A - V Aids	1,150.00			
Payroll Fixed Costs	265.00	279.00	439.20	983.20
Supplies and Materials		1,146.17	290.57	1,436.74
Travel	443.90	210.00	155.25	809.15
Other Expenses		80.00	320.00	400.00
Utilities		22.00		22.00
Repair and Replacement of Equipment		22.50		22.50
Major Equipment	1,341.12	2,892.38	2,150.56	6,384.06
TOTAL	4,700.02	7,585.80	9,928.51	22,214.33

Equipment purchases included slide, opaque and overhead projectors; copy machines; projection screens; tape recorders; teaching aids and tachistoscopes. Use of the opaque projector and Gafax 600 enabled students to examine both their own writing and that of their peers. The tachistoscope tested and trained students' power of observation, acting as a deterrent to lip reading by proving that it is unnecessary to utter each word in order to remember what is on a written page. The other materials were utilized for study of single unit concepts to supplement classroom discussion.

EVALUATION/APPLICABILITY

The experimental placement procedures noticeably reduced the number of students with serious writing handicaps in required writing courses. All instructors reporting recommended continued English Placement Testing using a writing sample, the Nelson-Denney Reading Test and high school achievement records to determine proper placement.

To facilitate placement procedures, it was proposed that one testing session be scheduled for each day of registration with an additional day offered the following week for late registrants.

It was further urged that a card indicating recommended placement in a writing course be presented to each student. The student, in turn, should give the card to his counselor or faculty adviser at registration. Copies should be furnished to the central counseling office and computer services for incorporation into the student's records.

Multiple means of classroom and laboratory evaluation were utilized. Progress was noted by instructors as each student presented an expository

paragraph each week. Also, at the beginning and end of the one-term course, students took alternative versions of diagnostic tests in skills basic to effective writing: listening, reading, spelling, grammar, and punctuation.

At intervals throughout the term both students and instructors were encouraged to evaluate classroom and laboratory texts, materials, assignments, and procedures. Upon completing the term, students prepared B versions of the tests given for English placement--the Nelson-Denney Reading Test and the Writing Sample. Performance was rated by the same board who had recommended students to Writing 11 and other writing courses.

Some problems for which there is no easy remedy were isolated. However, the course confirmed that it is possible for nearly every student to master sufficient language skills to continue successfully in his academic career if he is permitted to learn at his own speed using methods both he and his instructor consider optimum.

One of the unsolved problems brought to light was that less than half of the students requiring developmental training enroll in a remedial class. An even smaller proportion of those needing to repeat the course re-register. Unless each student becomes aware of his limitations and commits himself voluntarily to the development of new skills, the involvement necessary to persistent endeavors seems likely to be threatened.

The Developmental Writing course achieved four major purposes:

1. It sheltered students from threat and encouraged them to work cooperatively with peers and/or instructors until each written assignment communicated clearly;

2. Because it set weekly goals that each student could meet, it was unusually flexible for a highly-structured course;

3. In addition to affording honest appraisal, it granted personal attention and concern to each student;

4. It gained the respect of the vast majority of Writing 11 students and elicited constructive attitudes and conscientious effort.

Both Clackamas and Mt. Hood Community Colleges continue to maintain this program with only minor changes and are consistently pleased with the level of proficiency that students of limited writing skills achieve by taking it.

FUNDAMENTALS OF NURSING

Nursing Fundamentals 1, 2

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Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	X O	Community College
	O	Four-Year Institution
Level		4th year
		3rd year
	X O	2nd year
	X O	1st year
Area	X O	Science
	O	Social science
	O	Humanities
	O	Education
	X O	Technical/career
	O	Business Administration
Problem		Conceptual difficulty
	X	Diverse backgrounds
	X	Inflexible scheduling
	X	Need for personalization
		Issues ignored
		Lecture method inhibits learning
		Lack of relevance
		Loss of interest
		Realistic experience needed
	X	Alternative course structure needed
		Demand for theory-method consistency
		Other
Innovative Approach	X	Integrated curriculum/learning package
	X	Interdisciplinary/interinstitutional
	X	Media/multisensory reinforcement
		Onsite/field study
		Problem centered
		Process centered
		Simulation
		Tutorial/independent study
		Computer
		Programmed instruction
		Large group/small group alternation
		Other

ERIC Descriptors

Community Colleges, Nursing, Medical Education, Course Organization, Transfer of Training, Criterion Referenced Tests, Audiovisual Instruction, Student Teacher Relationship, Autoinstructional Aids, Laboratory Procedures, Laboratory Techniques, Audiovisual Aids, Integrated Curriculum

PROBLEM

The traditional teacher-centered, lecture-demonstration approach courses in fundamentals of nursing do not foster individual progress, nor do they permit the instructor to provide much individualized instruction. The assumption underlying the traditional approach is that all students will proceed at the same rate of speed. A student entering the nursing program is generally not given credit for past achievements and must enter at a point convenient only for the instructional staff.

The traditional approach makes little room for application and relation of concepts brought from other disciplines. Planned reinforcement of concepts and opportunity for transfer of learning are needed.

INNOVATIVE APPROACH

Planners of an innovative program developed a student-centered approach to Fundamentals of Nursing I and II, facilitating individual progress and expanding student-instructor contact.

The following objectives were sought:

1. To reorganize the nursing core content necessary to the performance of basic nursing fundamentals,
2. To organize the nursing core content into course concepts,
3. To identify important concepts from the sciences and humanities and plan for reinforcement and appropriate transfer of learning of these concepts,

4. To identify clearly the objectives to be achieved at each stage of the student's learning so that evaluation or progress may be objective and meaningful.
5. To develop an approach to teaching fundamentals of nursing which allows for individual progress and maximum student-teacher contact.
6. To plan for the efficient use of audiovisual, audiotutorial media for variety in learning experience.

Curriculum development took place in two stages. First, core content necessary to the performance of basic nursing fundamentals was reorganized; and second, course concepts were identified and ordered.

The course content was arranged into ten units and presented in a series of fifteen packets. Presentation was as follows:

A three-hour focus lecture took place on Monday, where the instructor presented a lecture enhanced by audiovisual material. The learning packet which reinforced the lecture contained the following:

1. Lesson Plan, consisting of two columns:

   Column I:

   Behavioral Objectives--spells out expectations for student learning for each unit of content and the basis for student evaluation.

   Column II:

   Learning Experiences--presents experiences in specific detail which the student must attempt during self-study periods in order to reinforce lecture materials and also attain behavioral objectives.

2. Principles--stating the "why" of nursing practice
3. Vocabulary--giving new terms necessary for learning new content
4. Pharmacology--presented as a thread through two-year curriculum
5. Laboratory--detailing assignments which the student must complete and material to be used to complete the experience (takes place in nursing laboratories)
6. Seminar--conducted on Friday to tie together student's learning during the week (Students bring questions.)
7. Self-evaluation sheet--containing a series of questions based on the packet material (When the student completes all the material in the packet, he completes the self-evaluation sheet and marks it to evaluate progress.)

Depending on their learning ability (and other factors), students spend only that time in the laboratory necessary for accomplishing the objectives.

Upon completion of a packet and all the objectives in it, the student takes a short exam covering the packet. Upon successful completion of the exam, he moves on to the next packet.

COST

All funds expended ($6,748) were for development. Approximately $4,780 was for salaries (and some consulting fees); $1,325 was for duplication, reproduction, travel, and communications, which are probably continuous operating costs (exclusive of regular salaries) on a year-to-year basis. The rest was for reusable equipment.

EVALUATION/APPLICABILITY

Evaluation of the program was accomplished by means of a questionnaire given students in the program. Most students felt instructors were interested in and concerned about them. Forty-eight percent, however, believed instructors did not have enough time to help the students.

Students generally thought the instructors fair, consistent, and trustworthy.

Students stressed that an excessive amount of material presented in a short period of time was their greatest barrier. They were frustrated by the number of procedures, by the lack of practice time, and by lack of laboratory supervision and equipment. Several students mentioned a fear of failing exams; other students questioned the exams and grading practices. Students also made several suggestions for improved correlation between theory and practice. They requested more demonstrations by instructors, rather than by the use of visual aids.

Project developers concluded that there was a need to reorganize material in each packet. (This was accomplished, and revised packets were used in Fall, 1971.) Most problems which arose had to do with the need for instructors to become comfortable with a different learning and teaching style.

Additional laboratory supervision is planned in the future because student response was greater than anticipated. This was gratifying because utilization of the nursing laboratories had not been demonstrated by previous students.

Developers concluded that the program was a successful venture because:

1. This group of students, in comparison to previous groups:
   (a) questions more readily,
   (b) has a better grasp of principles, and transfers this knowledge into practice with more ease,
   (c) has a better relationship with instructors,
   (d) is more supportive of one another,
   (e) appears happier with the program,
   (f) has felt more a part of the program, since suggestions have been acted upon,
   (g) performs with less anxiety in the clinical area
2. This group appears to retain content from unit exams since they all successfully passed the final exam.
3. Students responded to what we were trying to achieve--a student-centered approach with more contact with students, resulting in an environment conducive to learning.

In view of the project goal of providing self-paced learning, the presentation of a three-hour lecture each Monday appears not to fit the learning schedule of students who require longer than one week to master the material in the lecture and its accompanying packets.

This program--with its pre-recorded lectures, its packets, and its audio-visual machinery--could be taken over and copied in its entirety by any school with a nursing program.

INTEGRATED GEOGRAPHY

Geog 101, 2, 3

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Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
	O	Community College
	X O	Four-Year Institution
Level		4th year
		3rd year
	X O	2nd year
	X O	1st year
Area	O	Science
	X O	Social science
	O	Humanities
	O	Education
	O	Technical/career
	O	Business Administration
Problem	X	Conceptual difficulty
		Diverse backgrounds
		Inflexible scheduling
		Need for personalization
	X	Issues ignored
		Lecture method inhibits learning
	X	Lack of relevance
		Loss of interest
	X	Realistic experience needed
		Alternative course structure needed
		Demand for theory-method consistency
		Other
Innovative Approach	X	Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
		Media/multisensory reinforcement
	X	Onsite/field study
	X	Problem centered
	X	Process centered
	X	Simulation
	X	Tutorial/independent study
		Computer
		Programmed instruction
		Large group/small group alternation
		Other

ERIC Descriptors

Geography, Integrated Curriculum, Continuous Progress Program, Sequential Approach, Field Studies, Field Trips, Audiovisual Aids, Unit Plan, Simulation, Independent Study Laboratory Procedures, Laboratory Techniques, Student Research

PROBLEM

The sequence in introductory geography is presently taught at Oregon College of Education from a traditional, discipline-oriented point of view stressing lectures and demonstrations. Learner response takes the form mostly of class discussion and examination. Students are only fortuitously exposed to techniques and materials that they could later apply in their own professional experience.

In addition, there is very little integration and interrelationship between the segments of the sequence (which may be taken by students in any order) and often there are substantial time lapses between courses. The result is segregation of subject matter that could be more efficiently learned if the pertinent physical and human phenomena were logically intermeshed.

INNOVATIVE APPROACH

This project sought to develop an integrated, field-oriented approach into introductory geography, supported by modular units. Learner-responsive units were developed which covered major concepts and skills of geography appropriate to a liberal arts core program. Audiotutorial methods were also developed, and these allowed the student to acquire and review knowledge and skills at his own pace.

The Project Director and participating faculty developed the units for the revised sequence and taught the course.

Approximately thirty units in the form of modules were developed, called "unit plans." Each of these covered a set of related concepts for

approximately two classroom hours. A "unit plan" consisted of a packet of learning materials, including training aids, references and laboratory exercises. Field trip narrations were developed to be used either for class trips or self-guided trips. Audiotutorial material for each unit simulated the field experience for places outside of Oregon, as well as Oregon environments. Finally, the project developed problem-oriented laboratory exercises using spatial analysis to stimulate inquiry and develop deductive skills.

The innovative Introductory Geography project lasted five terms--from Fall, 1970, through Fall, 1971, including Summer term. During the first two terms, preparation of units and of evaluation tools was accomplished. Students began the sequence in Spring, 1971. They could take the course for six or for nine hours. Students taking the sequence for nine hours did three hours of independent research and field work. Evaluation and comparison with a control group followed each term's work.

COST

The major cost component in this project was salaries, which accounted for approximately 75 percent of the $12,000 budget. Instructional materials were developed at a cost of about a thousand dollars ($1,101.12), according to figures in the March, 1972, report. Thirty modules were developed at a cost of approximately $30/module. However, the total budget for instructional materials was $2,341, and if this amount were spent, the cost climbs to about $78/module. Not all of the ten planned television tapes were produced, which may have resulted in the savings in institutional materials.

Appendix II of the March, 1972, report lists 34 audiovisual items which were developed and approximately 750 slides. These can be reproduced at a moderate expense for use in other schools. In addition, once it is established that the experimental program is an effective one in terms of student achievement, the extensive testing program could be dropped, representing further savings.

EVALUATION/APPLICABILITY

Project developers planned an extensive program of testing and comparison with a control group in order to determine the effectiveness of the new program.

For each unit, five to ten objective questions were developed, and of these items, a final test was constructed which was administered to students at their entry into the sequence and at the conclusion of each term's work. An objective examination was developed, testing both the new, experimental group and the control group of students taking the old introductory course. It tested concepts common to both groups.

Results in the March 3, 1972, report noted that the experimental groups did slightly better in terms of improvement than did control groups, scoring about 10 percent better on the post-test. The same report makes some other pertinent observations: the factor of small enrollment hindered the effectiveness of some of the classroom activities; the flow was better in Summer, 1971, when one teacher had primary responsibility than in the following Fall term, when two instructors shared each offering; logistical limitations forced a reduction in the number of television tapes produced.

Project developers hoped for extensive applicability and felt that the units designed by them could be adopted in the present sequence, though it is also hoped that the entire experimental program will be adopted. Excerpts might also be duplicated for use in other schools in the Oregon system, including two-year and public schools. At Oregon College of Education, the materials will be made available to other courses and may be applicable to classes in earth science and social science.

9. PROBLEM CENTERED

Political Extremism (91) p. 237

Physical Chemistry Laboratory (92) p. 247

Integrated Chemistry Laboratory for Non-Majors (93) p. 253

Project Oregon's Future (94) p. 259

Related Projects:

Autotutorial Biology (71) p. 151

Industrial Engineering and Data Process Technology (61) p. 129

Fundamentals of Nursing (84) p. 221

Integrated Geography (85) p. 229

Interdisciplinary Ecology (62) p. 137

POLITICAL EXTREMISM

PS 480
Political Extremism

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Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
		Community College
	X O	Four-Year Institution
Level	X O	4th year
	X O	3rd year
		2nd year
		1st year
Area		Science
	X O	Social science
		Humanities
	O	Education
		Technical/career
	O	Business Administration
Problem	X	Conceptual difficulty
		Diverse backgrounds
		Inflexible scheduling
		Need for personalization
	X	Issues ignored
		Lecture method inhibits learning
	X	Lack of relevance
		Loss of interest
		Realistic experience needed
	X	Alternative course structure needed
		Demand for theory-method consistency
		Other
Innovative Approach		Integrated curriculum/learning package
	X	Interdisciplinary/interinstitutional
		Media/multisensory reinforcement
		Onsite/field study
	X	Problem centered
		Process centered
	X	Simulation
		Tutorial/independent study
		Computer
		Programmed instruction
		Large group/small group alternation
	X	Other (community participation)

ERIC Descriptors

Political Science, Interdisciplinary Approach, Thematic Approach, Audiovisual Aids, Films, Tape Recordings, Group Discussion, Small Group Discussion, Simulation, Conflict Resolution, Student Research, Student Participation

PROBLEM

Civil disorder and political polarization have become a familiar part of the national scene. Personal and academic involvement of students in issue-oriented, national political groups is at an all-time high. But the emotionalism generated by such groups tends frequently to discourage a vital task--an impartial examination of the beliefs and actions of the group.

INNOVATIVE APPROACH

The Political Science Department at Southern Oregon College (SOC) advocated setting up educational programs which would investigate the roots of dissent. A program was needed which would analyze in depth the reasons behind political unrest and convey to the students the importance of the subject. Besides the challenge of analyzing a political trend as significant as political polarization, Southern Oregon College felt the need for a program which would ease the tension between student radicals and right wing groups in the Rogue Valley. It backed up its argument for an analytic course by pointing to recent studies which showed that courses clarifying political rhetoric and stressing the common goals of Americans could reduce political emotionalism.

The traditional lecture method would not be adequate for presenting the dynamic aspects of extremism. Participation by students would be necessary if they were to formulate their own opinions on this issue of personal concern.

The program's impact would come largely from its innovation of a total-concept, interdisciplinary approach. Instead of offering one perspective

on extremism, the course would integrate several different scholastic disciplines to give a complete picture. Political extremists would serve as guest lecturers so students could form a first hand impression of them. Films and tapes would also convey vividly the tone of extremist groups.

Student participation would be achieved by an alternation of lecture periods with small group discussions led by project staff members. These discussions would include student simulation of crisis situations such as confrontation and conciliation. Other forms of student participation would include student research on topics of their choice and consultation sessions with staff members.

From June to August of 1970 the project director researched and wrote course materials. He attended meetings of extremist groups and conducted taped interviews with group members and with objective authorities on extremism.

Meanwhile, the project staff began selecting speakers. The four speakers who were invited to the course were briefed on the purpose of the class and sent copies of all course materials. The project staff chose films and videotapes, suggested topics for discussion, and prepared their lectures. They also constructed a test for measuring the direction and strength of students' political attitudes. After administering the test, the staff assisted students in analyzing how their attitudes were formed. Together, the project director and his staff worked out the schedule for the course.

The same course was given off campus at the Division of Continuing Education with the same content, the only variation being the comparative

smallness of the group. Through this offering, non-students were involved in an issue which concerned the entire community.

All 200 SOC students met together one night a week, first for a common learning experience--a lecture, film and panel discussion--then, after a break, for small group discussions. The student groups of twenty met in the same room every week, but leaders rotated from one group to another. Half of the leaders were professors and half, senior students. The rotation method was constructed so that each discussion leader ended the quarter with the same group he had the first time. This made it possible to spot group behavior changes.

Meulemans' article "Liberation or Revolution?" served as an introduction to the course. It set the tone of the course by beginning an analysis of the causes of current political unrest. The article avoided proposals for change--students were later asked to formulate their own solutions for political unrest.

Next, the class studied the characteristics of extremist groups, the impact of disorder on the democratic process, and police control of violence.

A "crisis model" was formulated to identify the causes of conflicts and the patterns which lead from conflict to violence. Students suggested methods of conciliation and tested their effectiveness by simulating the crisis situation. Students were asked to write a paper on the political future of the United States, emphasizing trends of political polarization.

COST

A little over half of the $4,629 grant was spent in development costs, the majority of which went for the release time of the project director together with the consultant fees of his staff members. About 10 percent of the development costs went for equipment--tape recorder and tapes. Almost all of the operational costs were for the director and his staff.

In duplicating the program, the development costs would be very small. Very little equipment is required and most of the material is either written or "live" (guest speakers). Some guest speakers may require compensation, and extra staff may be required to lead discussions.

EVALUATION/APPLICABILITY

The goal of the course--to give a relevant presentation of political extremism--was achieved. Students praised two aspects especially, the relevance of the course and its flexible presentation. Many found the films, tapes, and guest speakers a new and exciting dimension of learning. They also commented that the class design gave them freedom to pursue ideas which particularly interested them. A large number asked if the course could be continued next term.

One flaw in the campus course was its large number of students. The subject encouraged discussion, but the number of people in the lecture hall prevented a good exchange of ideas--students said they felt inhibited by the size of the group. The project leader will limit future classes to an enrollment of forty.

The small group experiment was successful. There was a general consensus that faculty members had a better rapport with the groups than student leaders did and could more easily relate their own insights to the discussions. But the degree of success seemed to depend more on the composition of the group than on the leader or the discussion technique. Some groups continued their dialogue long after other groups had disbanded for the evening. The best groups seemed to be the ones that were heterogenous in age and background. A group composed of several middle-aged students, housewives, young students, and a former member of the California Highway Patrol had the most constructive dialogues. The campus groups frequently complained of "too much agreement"--How could spirited debate take place when everyone already agreed? Communicating across different experiences and opinions required greater effort and offered a greater opportunity for learning. The campus discussions might have improved if more adults had been encouranged to attend and had been dispersed among the groups.

Older students with diversified experience seemed to be more receptive to open discussion, less frustrated when facing complex questions which had no "right" or simple solution. The older students were generally more satisfied with the course; some younger students were expecting more excitement in the course, and this attitude may have made them less open to a learning experience. Perhaps the course descriptions should have emphasized its nonsensationalism.

The topic which generated the greatest interest was that of police-community relations. The numerous student radicals in the class felt hostile

towards police officers before the course but understood the difficulties of law enforcement by the end of the quarter. Police officers, too, learned through the interchange of ideas. The success of this topic persuaded the project director to emphasize police problems more than he had originally planned. This was an excellent change. The director discovered policemen to be a resource close at hand and came to realize the significance of an improved police-student relationship in increasing the well being of the community.

Another successful project was the assignment of a paper predicting the future of political polarization and suggesting solutions for disorder. Students at first felt incapable of handling such an open-ended topic. But in the last weeks of the quarter, their ideas began to coalesce and their papers were good. Students said the assignment led to a more complete examination of political trends than they had ever made before.

The attitudinal test, measuring deep-seated political attitudes, given at the beginning and end of the course, indicated very little change in the political orientation of the students. The project may have been unrealistic in the attitude changes it expected to take place in one quarter. Perhaps a test which was more sensitive to slight changes of orientation would have been a more appropriate gauge. The test did serve, however, as a comparison between the college students and the adults taking the course.

The innovative concepts of this course are highly applicable to subjects other than political extremism. The total concept approach, with its impact, is very fitting for all "relevant" topics. Many topics are deemed relevant,

but the teaching method loses the relevancy of the subject. Traditional treatment reduces it to dull subject matter. Even topics which are not usually labeled "relevant" can be made challenging through the new SOC techniques. There is a great potential for curriculum based on questions and problems. The students are given direction by a stated problem and challenged to react individually in finding solutions.

The use of techniques to involve students is another aspect worth duplicating. Student participation is an important factor if students are to formulate their own ideas.

In constructing a course on political extremism, the materials developed at SOC can establish the content. Local guest speakers can replace SOC's lecturers thus relating the course more specifically to the community in which it is offered. Community information and involvement are vital parts of this curriculum. Meuleman's experience at SOC demonstrated the advantage of inviting adult community leaders to take the course and of making a special effort to involve members of local agencies, such as the police department.

As developed at SOC, the course is best suited to large numbers of students. The project director felt the need to limit the number of students in the lecture hall, but others may feel the student discussion groups would give students an adequate voice. Also small student enrollment would make adequate development difficult and might not attract as many guest speakers.

In the development phase, the SOC project director had the part-time assistance of six people (three teachers, three senior students) who

continued on as discussion leaders for the course. A project director seeking to duplicate the political extremism curriculum would not need such a large developmental staff. In implementing the course, the director might or might not use students as discussion leaders. College teachers were better leaders than senior students. But in another project (see OSU Elementary Philosophy), upper division students proved to be effective leaders after receiving training in discussion techniques.

PHYSICAL CHEMISTRY LABORATORY

Ch 443, 444, 445
Experimental Physical Chemistry

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Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
		Community College
	X O	Four-Year Institution
Level	X O	4th year
		3rd year
		2nd year
		1st year
Area	X O	Science
		Social science
		Humanities
		Education
	O	Technical/career
		Business Administration
Problem		Conceptual difficulty
		Diverse backgrounds
		Inflexible scheduling
		Need for personalization
		Issues ignored
		Lecture method inhibits learning
		Lack of relevance
		Loss of interest
		Realistic experience needed
		Alternative course structure needed
	X	Demand for theory-method consistency
	X	Other **(New experiments needed)**
Innovative Approach		Integrated curriculum/learning package
		Interdisciplinary/interinstitutional
		Media/multisensory reinforcement
		Onsite/field study
	X	Problem centered
		Process centered
		Simulation
	X	Tutorial/independent study
		Computer
		Programmed instruction
		Large group/small group alternation
		Other

ERIC Descriptors

Chemistry, Chemistry Instruction, Experiments, Science Experiments, Laboratory Experiments, Science Laboratories, Student Projects, Laboratory Techniques, Laboratory Technology, Student Developed Materials

PROBLEM

Revisions in existing experiments and development of new experiments in the course. Physical Chemistry Laboratory (normally taken by seniors at Oregon State University) have been slow in coming because:

1. Instrumentation and methods of physical chemistry have become increasingly sophisticated and more expensive. At the same time, enrollment has increased, causing available funds to be spent on additional equipment for existing experiments.
2. Development of new and innovative experiments requires a large amount of staff time and effort. Thus, most universities adopt a "standard" laboratory text from available choices which are, by their very nature, five or more years behind current developments. Efforts at improving instruction are best undertaken during the summer months but, at Oregon State University, there is no means of summer support for staff efforts to improve undergraduate education.

INNOVATIVE APPROACH

Project developers wanted to develop new and modern experiments for the Physical Chemistry Laboratory in areas of current physical research that a practicing physical chemist is likely to encounter in today's laboratories.

Each staff member was responsible for developing one or more experiments of his own design. The following experiments were proposed:

1. Rapid reactions (later eliminated)
2. Modular infrared spectrophotometer

3. High vacuum experiments

4. Ortho to parahydrogen conversion

5. Microwave diffraction experiments

In addition to these, circumstances allowed the performance of three more experiments:

6. Gas phase dipole moment measurement

7. Gas phase index of refraction measurement

8. Photolysis experiment

Progress and final reports contain detailed information about the ways these experiments were carried out. During the execution of the project, it was also decided to ask students to design and carry out a special experiment of their own each term.

Developers felt there were several difficulties in evaluating such a project. The real test was whether there would be "an increase in experimental capability in our graduates when they leave Oregon State University for industrial jobs or graduate school." An indication of this ability could come from employer assessments or from evaluations by graduate professors at other universities, but these would be delayed and difficult to obtain and would lack statistical meaning.

It was felt that the most important evaluation would come from questionnaires asking students for their assessment of the new experiments compared with existing ones. Supplementary evaluations would come from staff and teaching assistants. It was observed that evaluation of designing, testing, and writing up of individual experiments would be easier than evaluation

of students' experimental capability. Successful efforts would be published in detail in the Journal of Chemical Education.

The final report of the project noted that students appeared to appreciate the new experiments and that they made helpful comments on how to improve their educational value.

COST

The primary expense was salary which accounted for approximately 75 percent of a $6,130 budget. Remaining expenditures ($1,868.31) were for equipment and supplies. Though the equipment can be used and reused, there are no figures for its maintenance. An institution desiring to adopt these experiments would also need to check the cost of secondary equipment already possessed by the Chemistry Department of Oregon State University.

EVALUATION/APPLICABILITY

Applicability is probably not high in a project such as this, where, as the project officer notes in his proposal, "The inspiration for the experiments developed stems from research interests of the faculty." (p. 3)

Were the project the development of a model, this model might be copied, but this project seeks the development of experiments, and the successful accomplishment of these depends upon:

1. Faculty interests and competencies,
2. Student interests and competencies,
3. Equipment available (this project received several unexpected pieces of equipment and was able to be modified substantially during its existence).

Hence, institutions might be better advised not to try to copy exactly the experiments made at Oregon State University, but rather to modify them to meet their own individual needs.

INTEGRATED CHEMISTRY LABORATORY FOR NON-MAJORS

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108x
Experimental Chemistry

Applicability			X Describes this project O Potential use of this approach
Institution			High School
		O	Community College
	X	O	Four-Year Institution
Level			4th year
			3rd year
	X	O	2nd year
	X	O	1st year
Area	X	O	Science
		O	Social science
		O	Humanities
		O	Education
		O	Technical/career
		O	Business Administration
Problem			Conceptual difficulty
	X		Diverse backgrounds
			Inflexible scheduling
			Need for personalization
			Issues ignored
			Lecture method inhibits learning
	X		Lack of relevance
			Loss of interest
			Realistic experience needed
	X		Alternative course structure needed
			Demand for theory-method consistency
			Other
Innovative Approach	X		Integrated curriculum/learning package
			Interdisciplinary/interinstitutional
			Media/multisensory reinforcement
			Onsite/field study
	X		Problem centered
			Process centered
			Simulation
			Tutorial/independent study
			Computer
			Programmed instruction
			Large group/small group alternation
			Other

ERIC Descriptors

Chemistry, Integrated Curriculum, Laboratories, Science Laboratories, Chemistry Instruction, Problem Solving

PROBLEM

Several successful integrated laboratory programs have been developed for main-sequence science major students. However, a significant portion of the students at Oregon State University became involved in a shorter sequence of chemistry courses, and it was toward this group of students taking only general, analytical and short organic courses that attention was directed during the past two years.

For some time, laboratory work was deferred for one term in the nonmajor's general course, with an interim term of laboratory work between the general and analytical course. Consequently, the nonmajor's laboratory work consisted of the following:

1. Two credits of laboratory in the latter two terms of general chemistry
2. Two credits of laboratory in a separate course
3. Two credits of laboratory in the analytical course
4. Two credits of laboratory in an organic course

This sequence has been pursued by a variety of students majoring in agriculture, pharmacy, home economics, and other areas outside the sciences.

INNOVATIVE APPROACH

The project director's plan was to integrate the eight credit hours of laboratory work for the nonmajor students into two four-credit laboratory courses. Hopefully, a more effective experience would be achieved by avoiding the fragmentation, duplication and overlapping of experiments more inherent in four separate laboratories administered as adjuncts to lecture courses. A separate two-term sequence of laboratory concentration would also permit the development of experiments more relevant to the students'

needs. Furthermore, the visibility of a separate laboratory course would help orient students to the importance of this type of work.

In practice, the plan was modified by excluding the two credits of laboratory in the general course and adding two credits of classwork equivalent to that usually included in analytical chemistry. The total of eight credits remained unchanged and resulted in conducting the class with one lecture and two four-hour laboratories per week for two terms. This arrangement replaced the interim separate course, all of the analytical course, and the organic laboratory course.

By combining the separate laboratories and capitalizing on the equivalent of about 100 hours of laboratory time, the program planners selected and developed the most meaningful experiments for this group of students. Newly designed experiments were tested by two graduate students, and several established experiments were modified to fit the level of preparation expected of the students. Experiments were aimed at separations, synthesis, determination of structure, and quantitative studies of reactions, all liberally flavored with as much relevancy as possible to students' interests.

The following experiments were pursued in the two-term sequence:

1. Acid-base titration: the neutralizing capacity of antiacid pills
2. Analysis of vitamin C: titration with 2. 6-dichloroindophenol
3. Silver chemistry: reactions in the photographic process
4. Water analysis: cations, solids, phosphate, calcium by flame photometry
5. Soap films and one flotation; detergency

6. Calorimetry: heat of formation

7. Separation of solutions: gas chromatography

8. Avogadro's number: electrical and Perrin methods

9. Crystallization and melting point: hydrazones

10. Synthesis: t-butyl chloride

11. Thin layer chromatography: cholesterol acetate

12. An unknown acid: isolation, equivalent weight, pK_a, derivative

13. Ethanol: fermentation, oxidation, ether, derivatives

14. Distillation: fractionation

15. Spectrophotometry: vanillin in ice cream

16. Grignard synthesis

In addition to specially prepared descriptions of the theory and procedures for these experiments, students referred to a traditional textbook on quantitative analysis, particularly for the theory and procedures of instrumental analysis.

COST

This project required the services of a director at 40 percent FTE, which came to $9,000, as well as two 1/3 time graduate assistants, paid $1,000 each. All equipment and facilities were provided by the OSU Chemistry Department. No new purchases were required, which kept expenses to a minimum. Project planners estimated that staffing, space, and administrative costs were less than for the previous four-hour laboratory program.

EVALUATION/APPLICABILITY

Students' response to this course was, on the whole, favorable. Because the response was biased by the fact that students enrolled in the

trial run of this course were selected through advising, no valid statistical evaluations were made. One student, however, who dropped college and took industrial employment after the course volunteered: "I've used the spectrometer, lots of titrations, balances, GLC, and more. It's great to really be able to apply knowledge that I gained at school in the laboratory course."

A majority of the students strongly favored a laboratory course separated from the usual lecture course. This preference was based on both their prior experience and the concurrent experience of their friends who continued in the traditional courses.

From the instructors' view, this kind of integrated laboratory course greatly increased efficient use of laboratory time and made possible the inclusion of a wider variety of experience than is usually achieved in the traditional, separate laboratory courses.

PROJECT OREGON'S FUTURE

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Applicability	X	Describes this project
	O	Potential use of this approach
Institution		High School
		Community College
	X O	Four-Year Institution
Level		4th year
		3rd year
		2nd year
		1st year
Area	O	Science
	X O	Social science
		Humanities
		Education
		Technical/career
	O	Business Administration
Problem		Conceptual difficulty
		Diverse backgrounds
		Inflexible scheduling
		Need for personalization
		Issues ignored
		Lecture method inhibits learning
		Lack of relevance
		Loss of interest
	X	Realistic experience needed
		Alternative course structure needed
	X	Demand for theory-method consistency
	X	Other **(Need for total community approach to problem solving)**
Innovative Approach		Integrated curriculum/learning package
	X	Interdisciplinary/interinstitutional
		Media/multisensory reinforcement
	X	Onsite/field study
	X	Problem centered
	X	Process centered
		Simulation
		Tutorial/independent study
		Computer
		Programmed instruction
		Large group-small group alternation
		Other

ERIC Descriptors

Political Science, Conflict Resolution, Research Design, Field Studies, Community Study, Student Research, Research Problems, Research Projects, Social Change, Community Involvement, Citizen Participation, Activity Learning

PROBLEM

Four kinds of changes taking place in university education lie at the root of the decision made by the University of Oregon to develop Project: Oregon's Future. The first involves change in the role of students, who now expect more control and responsibility for their own lives and for society. Second, there are changes occurring in the kinds of learning expected. Students expect experiential, problem-centered, active learning situations. A third and negative kind of change relates to increasing numbers of students. Impersonal treatment, decreased creativity, decreased experimentation, and mass lectures have resulted from increased enrollment. The fourth change is in the relationship between the university and the larger community, where the need has developed for mechanisms which facilitate constructive communication between them.

These areas of change have tended to make the options open to students seem too limited for learning constructive ways of coping with and affecting society's future. Small budgets and teaching resources have narrowed the types of learning situations which could be offered.

A course available to many students was needed to coordinate field research activities and provide immediate service to the community. Such learning experiences would provide students the opportunity to learn creative and constructive ways of resolving conflict situations. The use of confrontational and violent approaches to problem solving would be minimized by this knowledge and experience.

INNOVATIVE APPROACH

A program of field research and community-based learning was developed as a new situation in which to learn constructive ways of effecting changes in society. The research would focus on real problems in Oregon and would assume a cooperative approach among students and community. Research projects would be defined in cooperation with public agencies and community groups.

Project objectives were to:

1. Create a faculty-student office to generate, coordinate, and publicize research into problems relevant to the citizens, agencies, and groups in this state;

2. Make available to all undergraduate students in the University (particularly those in introductory political science), the opportunity to participate in a research program which is based upon a systematic and planned effort to inventory problems and alternative solutions;

3. Provide for research findings developed in this program to enhance the quality and quantity of information used in public deliberations and policy making.

Project: Oregon's Future was designed not as a single course but as a resource center in the University, with a consortium approach to community problem solving. It would function as a coordinating research arm available to and supportive of agency, local government, business and community group efforts at problem solving. Students would gain practical skills in research directed toward using established community elements,

broadly defined, to solve problems. The community would have a technical assistance resource--the project staff and students--available to collect and analyze needed data. Regular curriculum courses would use the project as a resource for course work in problem-solving research.

The project would maintain background data, decision-making process information, and a structured array of community needs for problem-solving research.

The scope of this project is a system of problem-research-information, using community-student-community as a systematic resource for problem-solving. Students gain practical and academic experience: the community gains data coordination and information.

The project design was as follows:

1. Inventory (identify, collect, organize) information and expertise concerning future problems facing the citizens of Oregon,
2. Use this inventory as a guideline to direct and focus research into alternative solutions,
3. Use the method of approach taken by agricultural extension services, institutes for community research and development, and field research intern programs.

The major effort during development was the establishment of organization structure and legitimacy. An advisory board of community leaders called "Inneract," a project director (to direct research and public information activities), and a staff (eleven undergraduate students to conduct certain research and organization activities) were established.

The advisory board's task was to make suggestions about what research projects are appropriate to the project objectives. The task of the student staff was to take responsibility for organizing, researching, and soliciting field projects to be performed by students in the course.

To establish legitimacy among public officials, private service groups, organizations, and individuals in the state, a project director was selected who was a member of the State Advisory Council on Human Relations, which advises the Department of Labor on matters of possible legislative activity in the state. The cooperation of the Department of Labor was solicited in gaining access to state agencies and offices. The project director was also chairman of Community Development Projects for the Eugene chapter of the Jaycees, a potential resource in Eugene area field research as well as statewide. The involvement of a cross-section of leadership in the state was necessary if project objectives were to be shared by all citizens; the viability of the project depended on these mutual objectives.

The project staff was responsible for the following activities which were preparation for the course:

1. Establishing communications with agencies and groups to solicit advice, knowledge, and sponsorship,
2. Inventorying existing information concerning identified problems and solutions,
3. Organizing this information into a framework to guide the research activities of individual students.

Research problems were recommended by the staff and reviewed by the advisory board. Students, during the first term, then submitted research proposals. Proposals were evaluated in terms of project needs and standards of scholarly research. Credit hours were allocated each student according to the extent of effort required to accomplish their research project. The student registered the following term for the number of credit hours assigned to his project. Specific departments and courses for which each student received credit were determined by the nature of his proposed research; reading and conference designations offered in most departments were frequently used for this purpose.

Course grades were based on evaluation of the student's research report. Two criteria were applied: the sponsoring agency evaluated a report according to its practical value to them, and the faculty evaluated it according to its academic merit. If a report did not meet these criteria, the student received a "no-pass" (if the student was unwilling to amend report deficiencies) or an "Incomplete" (if deficiencies were to be corrected).

Student research expenses (including travel and out-of-town living expenses required by the project) could be funded in a grant by the project if such expenses were included in the student's research proposal.

Actual operation of the course began Winter term, 1970, within the structure of a large introductory course in political science. Some of the students volunteered to do research projects in community problem solving in lieu of the usual class testing and discussion group participation.

In Spring term the program was expanded to include a political science seminar in community problem solving. Guest lecturers from various elements of the community, along with resources developed by Project: Oregon's Future and a manual of background information relevant to community problem solving, were made available to the seminar students.

A project steering committee of Chamber of Commerce, University administration, and others in the Eugene community was formed by April, 1971, (Spring term) and news reports were released as an information effort.

During Spring, 1971, a series of meetings with other service clubs and action groups in the community was held to coordinate ongoing project activities such as problem collection, research problem selection, public information, and interagency cooperation.

An outgrowth of this cooperation and contact effort was project "Inneract," a joint effort by the University of Oregon and the Eugene Business Community. Begun in Spring, 1971, it had expanded to a committee whose members represented the Chamber of Commerce, the City Manager's Office, and alternative social agencies. Its major purpose was to serve as a focus of communication and cooperation.

Project activities may be summed up in this manner:

1. Winter term, 1971

   Introduction to Political Science--35 students (part of the introductory course membership) conducted community problem solving research using project resources, including consultation with the project director and staff.

2. Spring term, 1971

Seminar (PS 407) in Community Problem Solving--80 students--conducted field research using project resources including weekly guest lectures, the newly developed background information manual developed by the project. Also, some undergraduate staff members served as interns in the City Manager's office.

3. Fall term, 1971

Expansion of PS 407 Community Problem Solving to include more students.

Several things resulted from Project: Oregon's Future. A theory of community problem solving evolved from the experience of planning and implementing the project. The theory was generated from the perspective assumed by the project: to work toward community problem solving, within institutional, governmental and social constraints, acting as invited technical (research) assistants.

COST

The $37,802 budget was used almost entirely to pay the salary of the project director for two years and to pay for graduate and undergraduate staff.

EVALUATION/APPLICABILITY

Project Oregon's Future was designed to:

1. Promote communication and cooperation among the University community (administration and students) and elements of the local and state community,

2. Offer research services to community groups.

3. Offer action services to community groups.

The educational value for students in community problem solving was:

1. Practical research experience

2. Action experience from an existing institutional perspective (work within the system)

Key needs were the need for relevance in education, the need to learn how to seek positive change from within the system, and the need to learn how to conduct research in a real situation for problem-solving efforts.

Success of the project in terms of satisfying students' needs was measured by student demand for participation in courses which used the approach and resources of the project. The eleven or more students who were employed on the staff are one measure. The staff students showed a strong interest and commitment to the goals and procedures of the project as demonstrated by their constructive work in contacting and interviewing community groups and individuals and in developing the information manual and framework for problem solving. One part that needs more planning was indicated by the inability of the student staff to meet the technical assistance needs of the students doing research. Revision of the project in the second year (Fall, 1971) did address this problem. The development of specific program direction (Inneract, "self advocacy," etc.) was such an effort.

Student response was enthusiastic although there was frustration about the lack of structure and direction and the inability to implement problem-solving activities upon completion of the research. In response

to these frustrations, several action programs were developed by the project, particularly a community "self-advocacy" program and Canterbury Center for counseling high school dropouts.

Effectiveness of the project in terms of having met its objectives of promoting communication and cooperation among the students and community elements and offering meaningful research and action services to the community is evidenced by the speed with which formal communications mechanisms, favorable publicity in the public media, and student action opportunities arose.

Key student needs were met:

1. Relevance in Education. The successful development and implementation of student participation in dynamic problem solving, particularly in the research supplement arm, indicated a high degree of relevant education was achieved. However, the activity of developing and implementing a cooperation vehicle was only partly experienced by student staff (the interviewing phase) and not at all, directly, by course member students. The value of the project would be enhanced by direct experience in or observation of vehicles for cooperation among diverse elements. The difficulties involved in management (of student membership, for example) may be avoidable and the objective achieved through a plan for structured observation of cooperative activities.

2. Positive Change Within the System. In the early operational phase of the project, students expressed frustration at the lack of means for them to participate in implementing solutions suggested by their research projects. The vehicle devised for reducing this frustration was a set of action "intern"

programs for students. This approach may not be appropriate to the instructional mission (i.e., seek change from within the system) because the programs developed have a high degree of artificiality when compared to the normal operation of the system. While they may be highly educational and relevant, they are not true facsimilies of "how one seeks positive change from within the system" except in isolated, unusual cases. Thus, the need was met from an academician's perspective, but not from the perspective of a civil servant, or agency or business employee.

3. Conducting Research. The project revealed the need to learn how to conduct research of a real situation toward the solution of a problem.

4. Functioning Within the System. Students realized that although their knowledge of the situation increased, their knowledge of how to function in it was not directly approached.

The community objectives (secondary objectives--student learning objectives are primary) of cooperation research service and action service, were outstanding. A significant vehicle for local cooperation was established very rapidly; research was organized, problem centered and professional.

Overall, the project pursued a constructive planning effort. Original planning had been strong on rationale and general directions, and weak on procedures and components. This deficiency was corrected during ongoing planning. Structure and specific direction were successfully addressed and particular plans made. Evaluation of the effectiveness of the project on student learning would be improved by the administering of measurement devices. Care should be taken that a clear statement is made of what students ought to

learn in a participating course. Research methodology, process steps in problem solving, interagency cooperation devices, and techniques of intrasystem change efforts, are examples of potentially testable knowledge.

APPENDICES

Appendix A
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Appendix B
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Appendix C
Conversion of Project Numbers to Original
Educational Coordinating Council (ECC) Numbers (p. 287)

APPENDIX A

A Note on ERIC

An important feature of this manual is its use of ERIC Descriptors. ERIC, standing for Educational Resources Information System, was developed by the U. S. Office of Education as an information retrieval system based on the terminology educators actually use.

The basis of the system is the Descriptor, a word or short phrase characteristic of the document to which it refers. Naturally each document is usually referred to by several Descriptors.

Documents are listed by ERIC Descriptor in the Subject Index of Research in Education, a monthly publication of the ERIC Clearinghouse in Washington, D. C., available in most libraries. This publication also contains an Author Index, and a Document Resume section giving detailed information on each document.

The ERIC (Descriptor) System was adopted for this manual as a means of standardizing the terminology and practices herein described. It was discovered that different projects use different terminology for the same sorts of innovation, and the use of ERIC terminology will, it is hoped, facilitate communication and enable researchers to relate the work done here with similar work being done across the nation.

An investigator desiring to do this will be able to use the list of ERIC Descriptors provided at the bottom of the first page of each of the thirty projects contained in this manual. By consulting the same Descriptors listed alphabetically in the Subject Index of Research in Education, the researcher

will obtain a list of documents which may be relevant to his investigation. Should he wish to pursue any of these for further information, he would locate the document (using the ERIC accession number given in the Subject Index) in the Document Resumé section of Research in Education. There he will find an abstract of the project, as well as information about cost and how to obtain a copy of the project document. Full collections of ERIC documents are maintained in many local libraries, university libraries, and State Departments of Education. Most documents are available in microfiche or hard copy from

ERIC Document Reproduction Service
Drawer "O"
Bethesda, Maryland 20014

Further information on how to use ERIC may be found in "How to Use Eric," available from the U. S. Government Printing Office, or wherever ERIC materials are assembled.

Descriptors are indexed in alphabetical order in Appendix B of this manual, with numerical identification of the projects exemplifying the terms, followed by the specific page number in this manual where the project is described. This serves as an index to the manual. The ERIC Thesaurus, however, makes several discriminations which were felt to be of little pertinence to these projects. In such cases the descriptor is included in the index with reference to another descriptor which then refers to the project. Included in the index are also several terms which are not ERIC Descriptors, but which were used by project planners; these are references to the relevant descriptor. Thus, the index provides the most specific list of concerns to

which the reader can turn, and its inclusiveness (ERIC and non-ERIC terms) guarantees an excellent chance of locating the projects in this manual answering the reader's interests.

APPENDIX B

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APPENDIX C

Conversion of Project Numbers
to Original Educational Coordinating Council (ECC) Numbers

Investigators interested in pursuing information concerning any of these projects may find it convenient to refer to original ECC identification of projects. The number 2 before an ECC number indicates a 2-year project.

Project No.	ECC No.	Project No.	ECC No.
11	123	73	31
21	150	74	2-90
22	14	75	2-99
23	54	81	2-68
24	95	82	2-29
31	97	83	46
32	50	84	2-134
33	51	85	2-21
34	2-131	91	40
41	129	92	119
42	2-28	93	2-82
43	1-63	94	2-10
51	137		
52	2-75		
61	2-65		
62	2-102		
71	80		
72	6		